Does memorization without comprehension result in language learning?

By

Amjad Saleem

Centre for Language and Communication Research
School of English, Communication and Philosophy
Cardiff University

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Abstract

Muslims across the world memorize the Quran in Arabic for verbatim recall. Memorizers can be native speakers of Arabic, non-native speakers of Arabic, or non-Arabic speakers. The last category of speakers constitutes an unusual learner population, in that they cannot draw on primary linguistic knowledge to assist their memorization. Research on memorization suggests that memorization may instil sensitivity to patterns that can be used to bootstrap learning. The purpose of this study is to investigate if memorization of the Quran by non-Arabic speaking memorizers leads to pattern recognition in Classical Arabic.

Memorizers of the Quran with no knowledge of Arabic were tested on their awareness of language patterns through a grammaticality judgement task (study 2). Contrary to implicit predictions in the research literature, findings from the language tests indicated that the participants had not developed any sensitivity to the morphological patterns of Classical Arabic. These results are discussed in the light of expert Quran memorizers' reflections on their memorization practices (study 1), including what they brought to the act of memorization and what, according to them, underlay their success in memorization. It is proposed that memorizers' extreme risk aversion in memorization stands in their way of developing awareness of the language patterns. This interpretation is further evidenced by results from a follow up study on native speakers of Arabic, who also did poorly on the grammaticality judgement task.

The conclusion drawn is that Quran memorizers recite accurately because they don't learn the language. It is further concluded that Quran memorization is a special case, in which a range of extra linguistic factors such as identity, motivation and intention play an important role .

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Statement of orientation

When Prophet Mohammad PBUH gave the Muslims the sacred text of the Holy Quran he charged them to preserve its integrity for all people for all time. There arose as a result a miracle of faithful memorization and transmission of the text through the generations, such that, many centuries later, all Muslims continue to agree on every detail of form and content, unchanged in any way from the original. The manner in which this has been achieved makes us wonder at the capacity of the human brain when inspired by a spiritual task. It is even more remarkable when we realise that many of those memorizing the Quran do not know the words and grammar of language in which it is written. This thesis explores the nature of this cultural phenomenon, combining the tradition of scientific enquiry with a profound respect for those who serve the world and the Prophet PBUH through their faithful attention to the holy text.

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Chapter 1

Memorizing and remembering a long text in a foreign language

1.1 Introduction

Memorization can be an important aspect of our daily life. We may commit to memory a variety of information for different reasons. For example, we may memorize phone numbers, street names, and answers for exams for practical and utilitarian reasons; songs, and lines from movies for aesthetic and artistic reasons; and prayers or portions of religious texts for religious and spiritual reasons. We may consciously rehearse such information until we have learnt it by 'heart'. We may forget what we commit to memory after a short while, or the information may remain with us for a little longer i.e. hours or days. We may also remember information for years or for a lifetime.

In real life we also come across situations where people learn a limited amount of a foreign language to perform certain functions. For example, if a head of state visits another country whose language is foreign to them, he or she might choose to memorize certain expressions to say on particular occasions. Another kind of example is when classical singers flawlessly memorize songs in a foreign language they don't speak. It also happens when people learn foreign expressions to use in their own language, as is the case with many Latin and French phrases in English. People know what the expression does when used in English but may not be able to construct it, using the individual words, e.g. Latin: *sine qua non*, *ad hoc*, *habeas corpus*; French: *je ne sais quoi*; *savoir faire*; *fait accompli*. These and other such examples from real life present evidence of learning phonological form without knowing the meaning. In these cases, however, the learners know the function and the global meaning, otherwise they couldn't use them appropriately. It's the internal meaning they don't know—i.e., which part of the form contributes what. Although research does indicate that memorization may provide a link into language learning, the evidence is limited to certain situations, such as classroom learning, and acquiring language in natural settings (Myles et al 1998; Wong Fillmore 1976). In the classroom situation the evidence is rather thin and there is also a role played by instructions from teachers. In natural settings, on the other hand, especially when the learners are children, memorization has been shown to feed quite effectively into language learning. These issues will be discussed in detail in chapter 6.

This research project looks at memorization and language learning from a different perspective: what happens when a large text in a foreign language is memorized for its own sake without any apparent language learning goals? Does such memorization have any consequences in relation to language learning? The focus of the study is Quran memorization by non-Arabic speakers.

1.2 Quran memorization: basic facts

The Quran is the primary religious text of Muslims. It is in Classical Arabic and is read and studied by millions of Muslims all over the world. Almost every Muslim remembers portions of the Quran. Memorization of sections of the Quran is, in fact, part of a Muslim's early education.

Recitation of portions of the Quran is a mandatory part of prayer or *Salah*—an obligatory act of Muslim worship which is performed in a disciplined and ordered way five times a day. In every prayer, a portion of Quran text is recited. There is no room for variation or extemporizing while performing prayers. Everything, from the recitation to the act of praying itself, is performed in a set formulaic way. The Imam (the one who leads the prayer) and other worshippers are strictly forbidden to reformulate or add text. In the early days of Islam, the Quran was memorized for oral transmission out of necessity, due to low levels of literacy. The memorizers then were native speakers of Classical Arabic. Later on, as Islam spread to non-Arabic societies, individuals not knowing Arabic also had to memorize the Quran for exact recall, and it was here that the potential for a divorce between meaning and form occurred. Yet, if one listens to the non-Arabic memorizers' recitation of the Quran, one might assume them to be competent speakers/users of Arabic: they recite fluently and with ease, following a near-native pronunciation and the lilt of the language. Some memorizers even recite the whole of the Quran within the span of 5 to 6 hours in Ramadan night prayers.

Commenting on memorization and learning in Islamic schools from three different countries (i.e. Morocco, Yemen, and Nigeria), Boyle (2006) states:

> Memorization as a practice was initially related to the preservation of the Qur'an in its exact form, as revealed to Mohammed. On a basic level memorization of the Qur'an is associated with knowledge of the Qur'an, although not in the Western sense of being able to understand and explain it, but in the sense of being able to recite it. While the various groups and ages of

> learners I observed in the three countries were generally unable to explain what they had memorized, they did "know" some of the Qur'an in the primary sense of being able to recite parts of it. Memorization of the Qur'an, then, is synonymous with learning the Qur'an for many Muslims and as such is very important to Muslim communities worldwide (p. 487).

Apart from memorizing extracts of the Quran, a good number of Muslims memorize the whole of it. Islam encourages and emphasizes memorization of the Quran in its entirety. Quran memorization has always been an important tradition in the Islamic world. Although the Quran was initially orally transmitted, it has been retained in a single version over time. The unanimity about the Quran text on which all Muslims agree is in sharp contrast with other oral traditions, such as tradition of heroic poetry (where, as noted above, changes are not only allowed but part of the art) and other types of religious text, such as the Bible, of which there are multiple versions both in the original sources and in translation. The historical fact of 100% accuracy of the text over many centuries despite being passed through the memories and mouths of so many memorizers is remarkable. What implications might it have for the questions addressed in this study? In the final chapter, we will return to this question, since it will become apparent that the findings of the present research are inextricably linked to the matter of faithful transmission.

Quran memorizers consist of native speakers of Arabic, non-native speakers of Arabic and non-Arabic speakers. A person who memorizes the whole of the Quran is called a Hafiz in Arabic (plural Huffaz). The word *Hafiz* literally means 'guardian'. These memorizers are not necessarily scholars of Islam, nor do they necessarily become one.

The holy Quran is a text of considerable length. It consists of 30 Parts, and114 Chapters of varying length. The total number of verses in the Quran is sometimes taken to be 6666, and sometimes 6236, depending on what is counted as a complete verse. The length of time it takes to read/recite the Quran from cover to cover may vary according to the fluency, reading style and speed of the reciter. At a moderate speed it may take 15 to 20 hours. However, as mentioned above if read at a high speed as some memorizers do during Ramadan prayers, it may take 5 to 6 hours.

Quran memorization is characterized by four things: (a) it is memorized in its entirety by Arabic and non-Arabic speakers alike; (b) it is memorized for verbatim recall; (c) the tradition of memorization has been in practice since the earliest days of Islam; (d) a number

of memorizers are blind and have not seen the text in the written form. Like their sighted counterparts, however, they memorize the whole of the Quran and recite it with fluency and ease.

While different memorizers may attain different degrees of excellence in terms of memory of the Quran, the fact that it has been memorized in all its details for the last fourteen hundred years is a great feat of memory.

1.3 Motivation for the study

In the Pashtun community of North-West Pakistan, where I come from, Quran memorization has become an established tradition. Apart from people who memorize the Quran in their private time, there are those who memorize the Quran as full time Madrassah (religious seminary) students. Every year, hundreds of students 'graduate' as memorizers—a title used for those who memorize the whole of the Quran.

Like virtually all other children growing up in Pakistan, I memorized a few short chapters of the Quran for the purpose of participating in daily prayers and in aspects of school education. What, however, has amazed me is people who memorize the whole of the Quran. Since early childhood, I have wondered at the amount of text they memorize and retain for years even when they don't know the language. I have always been surprised by memorizers' speedy, uninterrupted and rhythmical recitation of the Quran. The question that has always attracted my attention was how they do it. Are they born with special talent for this feat? What method lies behind their memorization? These were the questions that triggered my interest in pursuing this project.

1.4 Research context

People can exhibit some truly extraordinary and stunning feats of memory. Stratton (1917), for example, reports the Shass Pollaks i.e. Jewish mnemonists of the Talmud, who were known for their memory of the exact location of any word on any page in the Talmud randomly opened. Seamon et al (2010) report a person, JB, who memorized the whole of Milton's *Paradise Lost.* Luria (1968) has described a person, S., with a limitless memory for

an array of information, including reciting a long and complex table composed of syllables, such as ‘ma’, ‘na’, ‘sa’, and ‘va’ perfectly eight years after he had learnt it.

As Treffert and Christensen (2005) note, some individuals, often with a form of autism, have ‘savant’ skills in music, poetry, prose, history, mathematic, and geography, etc. that involve extensive memory feats. Smith et al (2011) report on a linguistic savant, Christopher, who despite mental and physical impairments can “read, write, speak, understand and translate more than twenty languages” (p. 1). Their recall makes us wonder and we look at them in awe. Although savants fall outside the scope of normal memory research, their performance nevertheless offers us a window on the ‘extremities’ of what human brain is capable of.

Closer to our everyday experience are performers, such as actors whose flawless verbatim delivery of a long theatrical script on the stage makes us wonder about their memory. However, in most cases actors perform in languages they speak. What role does knowing the meaning play in their memory for the wording of the text? According to Noice and Noice (1993, 1996), actors semantically analyse and process the script and their verbatim memory is preceded by a deep understanding of the text. Wray (2008) argues that faithful reproduction of a text has to do with how much a performer/actor owns the text. That is, if a performer has written or created the text then it will be closer to his speech patterns and instead of memorizing every word and line, he will more likely produce text in his usual conversation style as compared to an actor who speaks lines given to him written by someone else. This issue will be discussed in detail in chapter 2, and then again in the final chapter with regard to the Quran memorizers’ awareness of language patterns.

Equivalent to actors are opera singers who have in memory entire works that take a whole evening to perform. Opera singers have to command not only the words and their interpretation but also the tune and musical context and cues, stage movements and so on. In contrast to actors, opera singers also perform in a range of languages that they may or may not have a separate command of. Irrespective of whether they know the language or not, actors and opera singers are constrained by a written text which they have to follow faithfully (Wray 2008, p. 175).

Contrary to reciting a fixed text from memory, there is an art form where artists/performers are not restricted by a written text. Research on oral poetry (e.g. Lord 2000) shows that in past generations, bards (performance poets) performed long poems live from memory. Trained in the art of oral recitation, they would present heroic stories to their audiences.

According to Lord, in oral traditions, bards did not just perform to reproduce one fixed text but also created the text in the process of singing. In other words, although bards would sing poems from memory, they were not restrained by verbatim recall because they improvised and extemporized the text: each telling of essentially the same story was different from any other. They thus mixed formulaicity and creativity in ways that are the basis of ownership and individual performances. I will return to this issue in chapter 2 (section 2.3) in relation to memorization and creativity.

Despite the different mechanisms of memorization of 'text' in these different art traditions, memory for form is largely anchored in meaning. This is relatively easy if one memorizes in language(s) one knows. In such cases, it is, therefore, difficult to separate memory for form from memory for meaning. In a pioneering work, Ebbinghaus (1964) showed that memorizing Byron's poem *Don Juan* in English was easier than memorizing nonsense/meaningless syllables. According to him, memorizing meaningful material required only one tenth the effort required for learning nonsense stimuli i.e. consonant-vowel-consonant (CVC) triads. The concepts of meaninglessness and meaningfulness are however, not one-dimensional. 'Meaning' can operate at different levels, because something that is apparently 'meaningless' can be given meaning by the individual. Meanwhile, something meaningful can be made meaningless if it is removed from context. What may appear meaningless to different people or in different situations may not be meaningless to other people or in other situations. Meaningfulness is not necessarily restricted to meaning in terms of contents of language. Meaningfulness may be the work of several other variables such as familiarity (how familiar an item is to a person), frequency (how often an item has been encountered), imagery (the degree to which an item evokes or produces an image) and regularity of structure which in turn may determine the learnability and memorability of form. This means that even if meaning is not available, learners can learn and memorize form if they 'know' it in other ways. See chapter 3 for a discussion of relevant proposals by Ellis and Sinclair (1996) and Gathercole (1995).

One of the most common experiences from daily life is that we remember the message or the gist of what is said to us but not the exact language in which it was said. Memory research (e.g. Sachs 1967; Gernsbacher 1985) also confirms this phenomenon. So, why do we generally remember meaning for a longer duration than the form? The answer to this is that under normal circumstances of daily discourse form is discarded after comprehension has taken place (Baddeley 2010). This issue will be discussed in detail in chapter 2.

What, though, of memorizing without access to meaning? Can one just learn a lengthy text by rehearsing the form over and over? And how does the brain's sensitivity to language form respond? Can aspects of the language be acquired in this way? Despite some lack of agreement on the role of memorization in acquiring L1 and L2, some research (e.g. Nattinger and DeCarrico 1992; Sinclair 1991; Weinert 1995; Wray 2002, 2008) indicates that there can be a link. It has also been argued that the knowledge of grammatical rules can emerge as a consequence of prefabricated word strings stored in memory (Bolander 1989). Given this research, it is therefore not unreasonable to ask whether non-Arabic-speaking Quran memorizers might end up with some kind of knowledge of Classical Arabic as a consequence of their practices.

The Quran is probably the only book which is memorized in all its entirety by a large number of Muslims around the world. Several researchers have explored the processes and practices involved in Quran memorization in communities where Arabic is a foreign language. Gent (2011a & b) investigated the educational significance of Quran memorization by observing and interviewing memorizers in North-East London. Drawing on experiences of Quran memorizers in Islamic schools in Morocco, Yemen, and Nigeria, Boyle (2004, 2006) described the intellectual, moral, affective, and spiritual effects of Quran memorization on the life of memorizers. Wagner (1993), and Scribner and Cole (1981) investigated the impact of Quran learning on cognitive abilities of students. Moore (2006, 2008) examined the practice of rote-learning in Quranic and public schools in northern Cameroon from a language socialization perspective. The emphasis there is "how and why novices are apprenticed through language into particular activities and identities" (Moore 2008, p. 645). According to Moore, learning in Quranic schools is driven by particular "intellectual and moral outcomes" (Moore 2006, p. 122):

> Qur'anic schooling was meant to socialize children into reproductive competence in Arabic and traditional Fulbe and Muslim values of self-control, respect for religious authority and hierarchy, and submission to the word of God. The practice of guided repetition in the Qur'anic context emphasized strict discipline, reverent renderings of the text, and deference to teacher and text (ibid.)

The short account above indicates that although there is some published work on various aspects of the Quran learning (we will consider these studies in different chapters as and when they become relevant), none of them has looked at the relationship between Quran

memorization and sensitivity to language patterns of Classical Arabic. Nor have these studies looked at how the practice of Quran memorization fits into research on memory processes.

1.5 Aims of the study

This research project is guided by the following central research question:

Does memorization without comprehension give Quran memorizers a 'foothold' into the language? That is, do Quran memorizers develop foundational insights into the nature of Classical Arabic?'

In order to work towards an answer to this central question, the thesis will address progressively more precise questions that drill down into detail. At the top level, we can identify four fairly broad subquestions that are first used as the structure for the literature review. The answers from the review will inform the subsequent empirical investigations.

1. What kinds of memory are there and how does information enter and stay in different memory systems?
2. What evidence is there that a foreign language might be learned passively as a result of memorization?
3. What are the specific practices of Quran memorizers?
4. Do Quran memorizers internalise linguistic information from Classical Arabic or not?

In this thesis, these questions will be examined by means of the research literature (questions 1 and 2) and empirical investigation (questions 3 & 4).

1.6 Outline of the dissertation

The first consideration that is addressed is the relation between form and meaning. Chapter 2 examines this relationship in some detail, with a focus on what happens to linguistic form during the processing of text and what is involved in long term verbatim memory. In order to

be able to fully understand how a long text is memorized and remembered, it is necessary to explore the types, nature and functions of memory. Chapter 3, therefore, considers the nature of working memory. Drawing on Baddeley's model of working memory (Baddeley and Hitch 1974; Baddeley 2000), light is shed on what resources are available for committing the Quran text to memory over the short term. Chapter 4 investigates what happens to text over longer periods and how it is maintained and remembered. The need for a memory model dealing with holding a text for period longer than the duration of short term memory and shorter than that of long term memory is addressed. Chapter 5 introduces the first empirical study. It reports an investigation into the nature of Quran memorization and the practices of the memorizers. The analysis reveals that while some practices of the Quran memorizers are in line with findings from research literature on memory, there are some practices which are peculiar to them. Chapter 6 looks into the relationship between memorization and the learning of a linguistic system. The focus is on situations where memorization is considered either to facilitate or inhibit language learning. In order to see if Quran memorization has resulted in some kind of language awareness, chapter 7 reports a second empirical study, in which non-Arabic-speaking memorizers were tested on their level of sensitivity to morphological patterns in Classical Arabic. In the final chapter (8), the central question is answered on basis of answers from literature as well as from the two empirical studies: interpretations are offered and conclusions are drawn.

Chapter 2

Memory for text—the relationship between form and meaning

2 Introduction

A linguistic sign, according to Saussure (1966), is a combination of a signifier (form) and a signified (meaning). Form without meaning is just half of the sign. Although in some situations surface forms are excellently retained in memory over time, in most circumstances, explicit long term memory for the surface details/forms of long-past linguistic events is poor or non-existent. Taylor (2012) and Port (2007), however, have proposed that there may be implicit accumulated memory traces for all aspects of the language—i.e. nothing is thrown away. In the account that follows, 'form' will refer to physical properties or surface features[1] such as the orthographic, phonological and acoustic representations of a text, while 'meaning' will refer to semantic properties, including contextual and pragmatic information.

Meaning is an abstract and conceptual property expressed through concrete linguistic forms, such as morphemes, words, formulaic sequences, sentences, signs, and pictures etc. The relationship between form and meaning or a signifier and a signified, however, is not simple. There are some curiosities about their relationship which this chapter will tease apart. The curiosities relate to how language is processed, represented and retained in different circumstances. A core element of the discussion relates to the following observation by Jacoby (1975):

> It is undoubtedly the case that in normal circumstances the word is treated as a symbol and processed only to the extent that is necessary to reach that which it symbolizes. However,

[1] Surface features are the things that one sees or hears, even before one does any processing at all. So there will be surface features even of a text one can't understand. This definition does not include syntax which entails deep processing, beyond that even of understanding the individual words. I would therefore keep separate the Quran memorizers' evident ability with surface form, while not assuming that they know any grammar at all, or can engage in any syntactic analysis or processing.

with an appropriate set, the physical information that is embodied in a word can become the object of study and be remembered over the long term (p. 251).

What Jacoby means is that in normal course of comprehension, words are taken as carriers of meaning and are processed only to the extent necessary for comprehension: in everyday use of language, words are only superficially processed and encoded, unless they are objects of study in their own right as warranted by appropriate conditions.

This implies that form and meaning are remembered differently under different circumstances. In order to find out how we can best conceptualize the nature of Quran memory, the following questions will be posed:

(1) What type of information is remembered better over short- and long-term intervals?
(2) Under what circumstances is verbatim memory for form possible?

In what follows I will first discuss literature relating to the traditional superiority of meaning over form. I will then refer to situations where form, as opposed to meaning, is remembered over longer intervals. This will be followed by discussion on two distinct and different art traditions where form is retained longer than normal. In the discussion section of this chapter, these questions will be answered in the light of key findings from literature dealing with form-meaning relationships in the context of memory for texts.

2.1 The traditional superiority of memory for meaning over form

I want to begin my exploration in this section by examining the three representations that Van Dijk and Kintsch (1983) offer in their cognitive model of discourse comprehension. The model assumes that while reading a text, a reader simultaneously builds three different mental representations: (a) a surface representation of text; (b) a representation of the propositional text base; (c) a representation of the situational model. According to the model, the three levels of mental representation correspond with the relatively shorter or longer memory trace for text.

Van Dijk and Kintsch first identify the surface representation of text, consisting of the exact words and syntactic structures. Memory for surface details, i.e. words and syntactic features as opposed to meaning is normally rather limited, poor and quickly lost. The representation of surface information, according to Sachs (1967; 1974), and Brewer (1975), is phonologically coded and is kept in memory for a few seconds only. The phonological nature of surface forms is borne out by everyday experience in that we keep on repeating a telephone number we have to dial, or have to rehearse an address until we have written it down, lest we forget it (see chapter 3 on short term memory).

In Van Dijk and Kintsch's model, the second level of representation is the propositional textbase which is an abstract representation of the message/meaning or idea of the text which consists of connected propositions or word concepts, and is independent of the wording used. Memory for the meaning of a text lasts longer than memory for phonological forms or syntactic structures but it tends to be lost after some time, as people find it difficult to differentiate ideas in the text from ideas that are to be inferred, but are not explicitly mentioned in the text (Radvansky 2008, p. 229). The representation of text at propositional textbase level explains why Bartlett (1932) found distortions of meaning during text recall. Using folktales from other cultures as his study material, Bartlett asked his British participants to recall the story as best as they could. He found that his participants recalled the story in a distorted fashion: their version of the story was based on their cultural assumptions and expectations which were the result of their general knowledge. This knowledge, according to Bartlett, is represented in the form of a schema which assimilates whatever it receives into an underlying gist. People, in the course of comprehension of a text, normally organize their memory along semantic lines, and reconstruct their recall in a non-neutral way, on the basis of the pre-existing schema. This observation also shows that form is not important in recall because if it was, it would tend to anchor the meaning more reliably to the original and prevent distortion, since the original meaning could be reliably revisited. This issue is quite significant in the context of the Quran—and particularly of course for those who are competent in Classical Arabic—because in recalling the Quran it is imperative to not reconstruct the meaning even though the cultures embracing Islam vary greatly. Because memorizers from different cultures with knowledge of Classical Arabic can potentially distort the meaning of the text, the need for emphasis on exact, word for word, recall is to guard against reconstruction and thus potential distortion of both meaning and form. The sacredness of the text ensures that the text be recalled verbatim irrespective of the knowledge of the

language of the Quran by the memorizer. The reason why adherence to the text as sacred and unchanging is so important can, therefore, be clearly understood in the context of this model.

Van Dijk and Kintsch's third level of representation is the situational model which is a mental representation of the situation to which the text refers, or of the event being described. It assumes that a reader while reading a text is chiefly concerned with the events being verbally described, and not with language of the text itself. The situation model tries to capture what is involved in text comprehension, and is, therefore, seen in terms of multi-dimensional representations involving, among other things, information about the tempero-spatial, causal, social and structural aspects[2] (Wyer and Radvansky 1999; Radvansky and Zacks 1991). Memory for situations or events is much longer and more durable than memory either for surface features or the textbase. Bransford et al's (1972) experiment on sentence memory shows that people fail to notice the difference between two formally different sentences that are situationally identical, indicating that they retain the situational information but not the form or precise meaning. For example, people failed to discriminate *Three turtles rested on a floating log and a fish swam beneath them* from *Three turtles rested on a floating log and a fish swam beneath it*. In contrast, they were more likely to differentiate *Three turtles rested beside a floating log and a fish swam beneath them* from *Three turtles rested beside a floating log and a fish swam beneath it* because the sentences describe two different situations (that is, exactly where the fish swam). Similarly, in a study by Kintsch et al (1990) people, after reading a text, were tested for the three different levels of representation at different intervals: immediate, 40 minutes later, two days later, and four days later. Results showed that while participants had high retention for all three representations of text at the immediate interval, a consistent decline in memory was observed for surface and textbase at longer intervals. As for the situational representation, retention across different intervals remained stable, showing superior memory for situations and events as opposed to memory for surface forms and meaning.

If Van Dijk and Kintsch are right in their description of three separate mental representations of text and the resultant and corresponding retention of information for each level of representation, what does that suggest the non-Arabic speaking Quran memorizers are doing?

[2] Given that my participants are non-Arabic speaking memorizers of the Quran and might not be engaged in text comprehension, I will explain in chapter 5 why the situation model still be useful and of interest to my study.

At what level of representation is the Quran text encoded? At first glance it may seem that these Quran memorizers do not attempt to encode or comprehend meaning to represent the text at either textbase level (level 2) or the level of situation (level 3). It may leave us with only one possibility: they engage with the wording of the text per se (level 1), which according to the model is prone to quick loss. Should that turn out to be the case, then the non-Arabic speaking Quran memorizers would somehow be defying and challenging the notion that the surface representation decays quickly in memory. However, it is important to note that Van Dijk and Kintsch's model, and the studies described here deal with incidental memory of text in discourse comprehension as the participants were not memorizing text. The non-Arabic speaking Quran memorizers, on the other hand, deliberately memorize the text. The question that we need to answer is: does deliberate memorization result in stronger memory for form than meaning? We shall explore this question in the discussion section of this chapter. There might, however, be other possibilities. One is that Quran memorizers are using meaning, but not text meaning. If so, then a broader definition of 'meaning' would be needed. This possibility is further discussed chapters 3 and 4, and is revisited in chapters 5 and 8.

The sort of evidence that led Van Dijk and Kintsch to formulate the model gives us a flavour of how memory for text operates. One of the pioneering studies on representation and retention of surface features in memory was conducted by Sachs (1967) in which she established the short-lived nature of surface features as opposed to the long-lived nature of meaning. Her study investigated what features are retained from listening to prose after comprehension has taken place. Participants listened to short passages. Their task was to decide whether or not a given sentence, presented after some interpolated material, had occurred in the original passage. The participants were to state whether the test sentence was identical to an original ('base') sentence or whether the test sentence had been changed in some way. Test sentences related to sentences in the original passage in one of four ways: (a) identical to the original; (b) semantically different from the original; (c) active voice changed to passive voice or vice versa; and (d) changed in form but similar in meaning. Here is an example of an original sentence and the way it was modified in three ways: (1) Base: He sent a letter about it to Galileo, the great Italian scientist; (2) Semantically different: Galileo, the great Italian scientist, sent him a letter about it; (3) Active changed to Passive: A letter about it was sent to Galileo, the great Italian scientist; (4) Formally different: He sent Galileo, the

great Italian scientist, a letter about it. A passage was played once and interrupted at required intervals.

Results showed that while participants detected a semantic change reasonably well even after 160 syllables of interpolated material, recognition of changes in form or voice consistently and significantly dropped at intervals of 80 and 160 syllables. With no interpolated material inserted however, changes in all sentence types were correctly recognized. According to Sachs, this is evidence that surface features are fleeting in nature, are stored only for a few seconds, and are displaced when new input is received. In contrast, meaning was shown to remain in memory for a longer period. Sachs (1974) extended the design to the visual presentation of the material (participants read the passage at a normal rate without rereading it) and replicated the results she had gained for material auditorily presented: while memory for surface features showed consistent loss at varying intervals of interpolated material, memory for meaning remained high.

Sachs' studies demonstrate that, at least in recognition tasks, memory for surface features fades away quickly compared with memory for meaning. These results are generally considered as indicative of differential memory for form and meaning in discourse comprehension and they lend support to Van Dijk and Kintsch's position. Having said that, we need to bear in mind that the short term memory constraints for written texts will not be identical to those for spoken input. Research has shown that memory for visual information is superior to memory for phonological information **(**Cohen et al 2009).

That memory for meaning normally predominates over memory for form has largely been attributed to semantic integration (Bransford et al 1972; Bransford and Franks 1971). According to the integration hypothesis, surface details are lost because during comprehension information gets integrated into a gist: the greater the integration of information into gist, the greater the surface information loss. Gernsbacher (1985) argued that this is what normally happens in the comprehension process as the goal is to understand the meaning by extracting it from the words. Words are, therefore, not represented in memory in their original form but within an amalgamated meaningful context. She illustrates the process by an analogy with cake-baking where different ingredients gradually lose their separate representation as they are no longer available in their original form. According to her, surface details, for thematically related sentences, will be quickly forgotten as they get dissolved into

gist; on the other hand, surface forms for thematically unrelated sentences will be better remembered because they stand as individual units, defying integration into a thematic whole. If Gernsbacher is right, then it implies that for natural languages, memory for meaning will always trump memory for form. On the other hand, non-Arabic-speaking memorizers may end up with a very good memory for surface detail because they cannot integrate the text into a gist.

So far we have considered what sort of information is remembered better over the short- and long term. Although the above account demonstrates the relative superiority of meaning over form over the long term, it does not mean that memory for form is not possible. In the following section, I will explore circumstances which lead to memory for surface features.

2.2 The role of phonological patterns in remembering the form

Research indicates that text such as poetry that heavily depends on poetic/ stylistic devices, and sound patterning such as alliteration, rhyme, rhythm etc., is better retained than prose. Rubin (1995) ascribes stable memory for long poems and songs in oral traditions over centuries to phonological patterning which provides "constraints that cue memories and restrict choices" (p. 65) in recall. Rubin and Wallace (1989) assert that sound patterning in the form of alliteration and rhyme etc. limits and signals a word more precisely than a single semantic cue. Words which are encoded only semantically may just provide one pathway for recall, whereas words encoded with sound patterns such as alliteration and rhyme may provide an extra/additional pathway (cf. chapter 3).

Boers and Lindstromberg (2005) investigated the mnemonic effect of alliteration on the recall of multi-word strings such as idioms. They claim that alliteration (the repetition of a particular sound in a word initial position in a phrase or a sentence) binds words together; alliterating words lend themselves to being processed as a chunk or a unit. They hypothesized that learners would show marked mnemonic benefits for alliterating words in a phrase under deliberate noticing condition. Students were made to notice alliteration by a teacher during a three-month English language proficiency course. In a gap-fill task, students recalled more alliterating phrases than non-alliterating ones. The conclusion they draw is that alliteration helps in the recall of words in a phrase, especially when people are made aware of it,

suggesting that text which exhibits salient sound patterning will show better pattern of retention than the one that lacks it. Boers and Lindstromberg suggest that this effect might also exist even when students' attention is not directed to the sound pattern.

However, we need to keep in mind the issue of reconstruction. That is, if one remembers the meaning and that there was alliteration, one can figure out what the words must have been if one recalls only some of the words. This is an important issue because it separates out, somewhat, Boers and Lindstromberg's participants from non-Arabic-speaking Quran memorizers. The Quran is indeed full of poetic devices such as alliteration, and noticing alliteration could indeed help with recall, but without knowing the meanings of the words, there would be tremendous risks of recalling the wrong word[3].

Investigating verbatim memory for poetry and prose text, Tillmann and Dowling (2007) tested participants' memory at different intervals. They had to decide whether or not the test sentence had occurred in the original input. Using Sachs' (1967; 1974) experimental method, they gave participants written or spoken prose stories or poems unfamiliar to them. A phrase occurring near the beginning of the passage served as a target. At various delays the target was repeated verbatim (O/Old), or a paraphrased lure was used, i.e. with a change in surface details (P), such as word order or voice, or a semantic lure was used, i.e. a change in meaning (M). The results indicated that memory for surface details of prose stories registered a considerable loss over time, whereas memory for surface details in poetry remained stable. In prose stories, participants showed lack of discrimination between original and paraphrased

[3] According to Wray (2014), although orthography influences our understanding of the notion of 'word' in that words are taken as units of language separated by white spaces, the concept of word is quite complex and vague. In the context of Quran memorization, what does a word mean to the non-Arabic speaking memorizers? While the sighted memorizers might have a notion of words in orthographic sense, especially because they memorize by reading from a printed text, blind memorizers may have an altogether different notion of it. But in recall, are the sighted memorizers recalling visually or phonologically? They might not have any words to recall so it might just be a sequence of syllables (i.e. articulatory sequences) and the advantage of alliteration may be that it provides some priming or activation process that facilitates recovery of an item in memory.

sentences. The poor recognition results for prose text are in line with Sachs' (1967) findings, and Van Dijk and Kintsch's (1983) model of surface representation discussed above. With poetry texts, participants were able to correctly discriminate the original from a rhymed paraphrase across various delays. Although the paraphrased rhymes were very close to the original (see examples 1 to 3 below), the original could have been selected on the basis of elegance and scansion as the new versions are less good on that front.

(1)
Man and boy stood cheering by
And home we brought you shoulder high **(Original**)
Man and boy stood cheering by
We brought you back home shoulder high **(Paraphrased)**

(2)
If I choose the one I love, I would be thought a disloyal son (**Original)**
They would think me a disloyal son if I choose the one I love **(Paraphrased)**

(3)
A voice methought within the Tavern cried **(Original)**
Methought a voice within the Tavern cried **(Paraphrased)**

Tillmann and Dowling explain this difference in memory for linguistic forms between prose and poetry in terms of the relative importance that surface forms carry in each case. In prose, linguistic details are important in so far as they convey the meaning, and help in comprehension, whereas in poetry on the other hand

> […] the importance of formal organization and sound patterns rivals the importance of linguistic meaning. The perceiver needs to grasp the specific surface realization—an intrinsic part of the poem—to appreciate it (p. 636).

Although Tillmann and Dowling's research shows that poetry is remembered better than prose, and that sound patterns such as alliteration, rhyme, rhythm, etc. have an advantageous effect on remembering linguistic forms, their findings are limited to one's first or native

language. As mentioned earlier, we cannot say that meaning might not have influenced reconstructing the form. What we don't know is if the superiority of poetry over prose in terms of remembering in a language one knows would apply to foreign language too. In the context of my study the role of sound pattering could be an important factor to consider. The Quran is known for its poetic style, i.e., it has rhythm and rhyme, and is read and recited with a particular lilt and pitch. Does the poetic style of the Quran, with its musicality and cadence, contribute towards its verbatim long term recall?

Rubin (1977) investigated long-term verbal recall for prose and verse passages acquired by American undergraduates in the course of growing up. In experiment 1, memorizers were tested for their written recall of *The Preamble to the Constitution*, *The 23rd Psalm*, and *Hamlet's Soliloquy*. These passages had been memorized years ago and some memorizers were said to have had their last experience with the passages quite a few years back. In a second experiment, fifth- and sixth-graders who had learnt about or had only been exposed to but not memorized *The Preamble to the Constitution* and Lincoln's *Gettysburg Address*, were tested for their memory of the passages. As opposed to the long intervals (spread over years) in experiment 1, participants in experiment 2 were tested over relatively short periods of time (six- and eighteen-months). According to the results, both undergraduates and elementary school students showed accurate free recall. Participants had good memory for surface forms even in the absence of rehearsal (experiment 1) or when they had only been exposed to the text without memorizing it (experiment 2). Rubin interprets his results in two ways: (a) the long term memory of these passages is due to the stable state of these texts—they were *encountered* in a stable state, which encouraged verbatim recall; (b) different texts demand different kind of recall and people in general know what is required of them when recalling a particular text. For example, while recall of narratives demands recalling and reconstructing the gist (cf: Bartlett's study above), texts such as the Bible are expected to be recalled verbatim rather than reconstructed.

Rubin reasons that an individual being aware of the task demand might show differential memory for form and meaning, depending on the type of text (p. 620). According to Rubin's account, it can be argued that memory for a text is a function of task demand as well as the nature of the text. While some texts such as religious books are to be remembered in terms of their literal wording, others such as narratives and stories are remembered for the gist.

2.3 The tradition of oral poetry

We saw earlier (see chapter 1) that oral traditions are a particular type of cultural practice at the boundary of memorization and creativity. Oral poetry dates back to pre-literate times (Parry 1928/1971; Lord 2000). Parry developed a theory of oral poetry according to which long epic poems such as those of Homer were passed on by word of mouth for centuries before they were written down. Although Parry and Lord do talk about Homer's epics, the main focus was on living Yugoslavian poets. The original composer performed the poems, and also apprenticed novices into learning them. Once the originator had died and the apprentices had become the masters, these new performers had licence to introduce their own variations, with the result that no single person was the author. It was much later that these epics were written down and became fixed in language and contents. Once there was a written version, there was a change in perception about correctness, i.e., a written version is considered more definitive than the oral one.

Lord (2000) reasoned against the idea of mere reproduction of one fixed text being told and retold, and rather stressed the importance of understanding the nature of the oral tradition whereby the artist was not only the performer but also a creative composer (p. 13). Studying Yugoslav bards while they performed and composed live at a high speed, Lord attributed their performance to the special techniques of oral composition. According to him, in oral traditions the singer/poet composed his stories in collaboration with the audience. Epic poems were sung and composed over multiple performances. Every performance was unique in the sense that bards changed the telling of a story/song according to the occasion, yet the telling of each story was a version of the same essential theme. A performance bore the stamp of the singer/composer as he improvised on memorized text and yet kept the fluency in a live performance. This situation can be compared with how children might tell and retell a fairy story, with a prescribed structure and content, and many memorable formulaic phrases that must be there, but free licence to add and change little details, and choose the form, especially as a response to the individual child.

Parry ascribed the fluent performance of a complex epic poem by the bards to the formula which is "an expression regularly used, under the same metrical conditions, to express an essential idea" (Parry 1928/1971, p. 13). According to Wray (2008):

> Formulaic material offered advantages to the performer, whose major challenge was to balance his memory limitations, the requirements of the metrical form of the verse, and the contents of his story (p. 40)

Formulas thus served a practical purpose in the oral tradition: to aid the recall of long and complex epic texts. For example, they provided cues and constraints, such as rhyme, rhythm, alliteration (Rubin 1995, p. 176). Formulas were a handy device in that they provided the required metrical/acoustic pattern to complete the line (ibid, p. 197). And they gave the performer time to think ahead, because they were fully memorized and easily generated, requiring little attention. Bards had available to them a repertoire of a great number of such formulas for a particular song used in predictable circumstances. The formulas included repetition of exact phrases, repeating phrases with minor changes, and noun epithets (i.e. combination of words describing a particular situation or a character). Noun epithets were by far the most common used formulas in Homeric poems, such as *brilliant long-suffering Odysseus*, *aged horseman Nestor*, *cow-eyed queen Hera*, *swift-fitted brilliant Achilles*, *very thoughtful Penelope* and were always used when referring to a particular person/character (Rubin 1995, p. 203).

The above account indicates that oral poems, like fairy tales, were a mixture of improvisation and fixed forms. Oral poetry is a kind of art form that mixes formulaicity and creativity in ways that are the basis of ownership and individual performances. The role of creativity complicates the issue, however. Creativity might be part of the reason for memorability because bards were not constrained by one particular text: they could choose from a wide array of formulas available to them. The deliberately unfaithful transmission, however, undermines attempts to ascertain how accurate recall could be over several generations. In the discussion section of this chapter I will argue how the Quran memorizers, unlike the bards, might have a long term memory for form without changing the text.

2.4 Actors' memorization of the theatrical script

The above account has indicated that the singer of the oral tales was also a creative artist: he would compose a story as he was going along, involving the audience. Verbatim recall was thus balanced by an inherent need for creativity. In this section, I will take up the issue from the other end. That is, what happens when one memorizes and remembers a written (i.e.

fixed) text for verbatim recall? What are the mechanisms for memorizing such a text? What constraints are involved in remembering a written text? These questions will be answered mainly with reference to actors' memorization practices.

Unlike bards who sing a fluid and pliable text, actors are constrained by a written text. Actors are duty bound to memorize a written script for a perfect delivery on stage (Wray 2008, p.175). They can neither paraphrase nor change the words of the script. The differences between bards and actors in relation to their memorization practices and techniques are rooted in the art form they practise.

Noice and Noice's (1996, 2006) work on actors' verbatim recall on stage reveal that actors, as compared with the bards performing oral poetry, adopt a different mechanism to achieve a perfect verbatim recall. Actors make a mental representation of the text based on elaborations and explanations of the script. They combine repetition with a deep understanding of the text meaning. Indeed, it seems that actors analyse the text in detail without intentionally or consciously memorizing the lines. That is, their initial concern is not to memorize the text; instead, the focus is to reach deeper understanding of the script by analysing and dissecting the intentions, emotions, and the internal struggle of the character. Noice and Noice (1993) showed that professional actors, relative to novices, achieved superior memory due to their ability to organize the script in a causal relationship. Actors established more cause and effect relationships among the characters, imposing a sequential order, weaving each utterance into a chain of relationships leading to high recall of the wording and the order of the lines. Noice and Noice claim that it is this attention to the text at a detailed level as well as semantic elaboration that leads to high retention, resulting in verbatim recall of linguistic material.

Although actors are the most well-known practitioners of verbatim recall of script on stage, they are not the only people who achieve such a feat of memory. Research shows that there are individuals who memorize texts of even longer length and complexity than a theatrical script. Seamon et al (2010) report a septuagenarian named JB who had memorized the whole of Milton's *Paradise Lost*, a 60, 000 words long poem. JB had started memorizing the poem at the age of 58 and it took him nine years to complete it.

JB was tested orally across all 12 books of the poem with two cued lines from the beginning or middle of each book. According to Seamon et al, apart from the lower recall for cues from

the middle of two books (i.e. VII and X, which, according to him, had been least practised as compared to other books), JB showed exceptional memory for all cued tests (p. 500).

This spectacular memory performance has been explained in relation to events from JB's life and the way he approached the poem, that is, JB's experience in theatre. According to Seamon et al:

> Although JB has a considerable experience in remembering acting lines and story telling, he considers his memory for Paradise Lost not to be based on any special memory talent or the use of any mnemonic techniques. Indeed, Milton's poem is a meaningful story that does not require mnemonic devices to render it meaningful. Rather, JB attributes his mastery of Milton to his sheer determination to memorize this poem by thoroughly understanding it and repeatedly practising it over a period of 9 years (p. 499).

The core issue in JB's memorization is the size and complexity of the text and his approach to memorizing it. His memorization of the poem reflects two things: deliberate practice, and his understanding of the poem. According to Ericsson and colleagues (Ericsson et al 1993; Ericsson and Charnes 1994), expert performance is a result of highly structured and systematic deliberate practice or persistent hard work spread over time. Achieving mastery in a particular area requires an investment of time and perseverance. Skilled performance, according to Ericsson and Charnes (1994), is domain specific, i.e. it is limited to one's field of expertise and does not go beyond it. JB's exceptional memory for *Paradise Lost* could be attributed to his persistent practice. In terms of understanding of the text, experience of working at the theatre had equipped JB to use semantic encoding and elaboration to memorize lines for a perfect recall. According to him, "The real challenge was just not to memorize it, but to know it deeply enough to really tell Milton's story. As I finished each book, I began to perform it…" (p. 499). JB's efforts and perseverance notwithstanding, his expert verbatim memory for a very long text was anchored in the knowledge and understanding of the text. It was, then, an extreme extension of his acting expertise.

Wray (2008) argues that since a written script is predetermined, it imposes its own constraints on the actors in the sense that they have to deliver the scripted material in a way to make it look like natural and spontaneous speech. This creates a potential problem if the author's turns of phrase are not natural to the actor. Were the actor a bard, s/he would rephrase the text

to match his/her preferred way of speaking. This, however, is culturally not permissible, unless the author specifically allows it: "A script has a status, as the product of the writer's creativity that somewhat protects it from alteration" (Wray 2008, p. 183).

An important issue behind actors' faithful recall of the script is the 'ownership' of and relationship with the text. In Wray's view, users/actors normally do not 'own' the text, and therefore cannot manipulate it in terms of changing or deviating from it either for fear of being unfaithful to the text, or out of deference to the authors. Actors are thus tied to the exact reproduction of the text with no or little room for modifications. Hence, they are to internalize every detail of the script. Wray contends that "faithful reproduction" makes users of text "surrender ownership of the words, [as they view] themselves as agents whose role [is] simply to re-present the text" (p. 257). On the other hand, actors who also happen to be the creators of the text can take liberties with it.

Wray examines this issue in the light of *The Extras*, a 1994 sketch by television comedians French and Saunders. Two sets of actors participated in the performance: The two authors of the script, and two guest actors. According to Wray, while those who authored the text did not stick to the script in performance and improvised changes to it as "Lines were rephrased, redistributed, reallocated, and augmented" (p. 181), the guest actors mostly adhered to the lines they were to deliver, resulting in a markedly less spontaneous-sounding performance. Wray attributes the main difference in performance of the two sets of actors to their relationship with the script. Those who 'owned' the script in that they wrote and formulated the linguistic materials (p. 175) were likely to reformulate them at will. The guest performers, on the other hand, were 'outsiders'. The ownership of the material released the authors from "some of the constraints on naturalness that are normally imposed by the formulaicity of the script. Specifically, because they are the writers, the ideas have originated with them" (p. 183), and the script "reflects their speech patterns" (p. ibid). Since we all have choices within our repertoire, the speech patterns they wrote down were just one option and they freely reformulated into new ones during the performance. Authors of the script have the authorial rights to improvise instead of reproducing it verbatim. We might even say that the written version is just a mnemonic to anchor the idea.

The relationship and tension between creativity and formulaicity thus bears on how a text is remembered. A further aspect of licence to be creative is explored by Wray (2008) in relation to the memorization of Mao's sayings, as described in Ji's (2004) *Linguistic Engineering*.

The sayings were memorized verbatim by constant repetition as part of a dominant cultural practice. They were considered as standard text, embodying correctness of attitude and thought, and were quoted in an appropriate context to shed light on aspects of their lives. The aim was to make people think in the same way, imposing uniformity of thought, stripping them of individuality, diversity of opinion, and creativity. Because the consequences of political non-conformity, even if unintentional, were severe, to avoid saying the wrong thing, using and quoting Mao's words was the safest course. It signalled commitment and conformity to the Revolutionary spirit. Ji's account includes anecdotes in which this practice had unintended consequences. Mao's message was distorted not because it was changed, but because of a lack of creative engagement in how to apply it to a new situation. Making reference also to Orwell's *Nineteen-Eighty-Four*, Wray (2008) asks whether formulaic language is responsible for formulaic thought and concludes that formulaicity may be used as means of suppressing creative thought in that the formulaic language may restrict speakers to saying things in one particular way only.

This relationship with a text, where intelligent intervention is required in order to appropriately interpret its message in new contexts is equally valid in relation to fundamental interpretations of the Bible and the Quran. This is, however, the domain of a different kind of religious expert—those whose job it is to preach about the meaning of the Quran. As it is not in itself central to the question of how the Quran text is successfully memorized, so it will not be pursued further.

2.5 Discussion

This chapter has focused on the relationship between form and meaning. The literature has indicated the following key findings. These findings will make the basis for the discussion of how these findings interrelate and what they mean for the Quran memorization.

- Memory for meaning and not form is the default option in everyday discourse
- Form can be remembered under specific conditions
- Differential memory for meaning and form can be a function of text type
- Memory for form can be a function of deliberate practice

The literature suggests that in everyday discourse meaning has an advantage over form as far as long term retention is concerned. People tend to remember the gist of information rather than the linguistic details. Memory for surface/linguistic details is very short, easily gets distorted and so is not normally available for recall.

Because there is an unavoidable form-meaning relationship, it is very difficult to separate the learning of form from the learning of meaning in tasks performed either in first language(s), or another that is well-known. A true measure of learning form independently of meaning might, therefore, only be obtainable using nonsense input in a foreign language when semantic contents are not comprehensible to the learners (Gathercole 1995; Ellis, 2001 cf. chapter 3). Only in this way can we gain an idea of how, if at all, 'words' are stored on their own as meaningless phonological strings.

Some evidence emerged in favour of verbatim recall of text at longer intervals: surface structures can be retained and recalled faithfully after long periods of time under specific circumstances. Poetic text was shown to be remembered better than prose because prosodic patterns, such as rhythm and rhyme, assist with anchoring the form in memory. It might be argued that the Quran text, being known for its rhythm and rhyme, its musicality, and its peculiar and distinct way of recitation, would be better remembered than a text without these features.

From the account of oral poetry it was clear that although the bards remembered the text over the long term, they enjoyed flexibility in narrating the story. Bards had a long term memory for the contents of the poems in that they told the same (core) story over and over but also, added changes to (and thus created) the text. Indeed, creativity was the very essence of this type of oral transmission and no one definitive version of the story would be recognised until it was written down. The Quran, like oral poetry, was transmitted by word of mouth initially but, quite unlike it, the Quran cannot have been 'creatively' transmitted. There is one text of the Quran on which all Muslims agree across the world. Had it been creatively transmitted, changes would have crept in over time, resulting in multiple versions of the text. So, unlike bards who, apart from performing the poem also created its text, Quran memorizers were memorizing and remembering a fixed and unalterable text, internalizing every detail of it.

When non-Arabic speaking people started memorizing it, there would have been no alternative to heavy focus on the details of the form.

Like actors, Quran memorizers have to memorize a fixed and definitive text for a verbatim recall. They are thus constrained by a written text and cannot deviate from it. However, unlike actors who almost always understand the script, the Quran memorizers in this study do not know Classical, or modern, Arabic. The non-availability of linguistic or compositional meaning would put pressure on them to internalize every detail because should they forget a word, they would not have a means to retrieve it. In chapter 3, however, we will see that while there might not be a word or sentence level meaning correspondence, there might be other meaning associations to remember the text. The non-availability of linguistic meaning, however, is an important issue and will lead us later (see chapters 6 and 8) to the consideration of the very nature and status of the text in how and why it is remembered and recalled the way it is.

Although expert actors memorize at high professional standards and are not expected to make errors of omission or commission, they can still make errors in recall, such as substituting one word for another, without any greater consequence than embarrassment and, perhaps, annoying the author. That is, if, by mistake, actors forget to recall a word or a phrase correctly, there are no consequences. In contrast, rephrasing or reallocating Quranic words or phrases constitutes a major sin of blasphemy. Any attempt to manipulate or change the text has serious consequences. Quran memorizers, therefore, cannot afford being reckless or careless in remembering the text.

The role of deliberate practice was also considered. It was especially obvious in JB's memorization of the entire of *Paradise Lost*. Although JB understood the poem as a meaningful story, it took him nine years of persistent practice and rehearsal to master the recitation. In the context of the Quran memorization, it can be argued that if the Quran memorizers did speak Arabic, as the original memorizers at the start of Islam did, then it would be very similar to how JB memorized *Paradise Lost* and how actors memorize theatrical scripts: the Quran memorizers' knowledge of Arabic would facilitate their understanding of the text which in turn would facilitate its memorization. An important question that arises here is: was the tradition of faithfully memorizing the Quran established so that it could be done in the way that JB memorized *Paradise Lost*? If so, a significant

impact of Islam moving into non-Arabic speaking countries was the loss of the opportunity to link the memorization into an understanding of the content of the text. However, in chapter 8 it will be suggested that, irrespective of the way Quran memorization originated, non-Arabic-speaking memorizers may be a *model* for other memorizers, rather than an anomaly.

It was noted that faithful/verbatim remembering occurs when a memorizer is (or considers himself) an agent of the words of the author of the text. Actors are one class of such memorizers. Actors are not normally the authors of the text and as such do not have the authorial rights to amend or edit it. Only if one is the writer/creator of the script does one own the text and have latitude to change or improvise around it. This 'right' cannot be claimed by an actor who just performs a script written by someone else unless the author agrees. Bards were able to manipulate and play with text of their work because they were the 'authors' of the text and thus owned it.

Quran memorizers consider themselves to have no authorial rights. For Muslims, the Quran is the work of God. That is, they believe that God is the creator of the text which is definitive in nature and a memorizer's job is to remain faithful to the words of God.

When we entered this chapter we wanted to know what the relationship between form and meaning is, in the context of remembering text. It has been found that in everyday discourse people process and remember the meaning and gist of the information as opposed to the form. However, memory for form is possible under certain circumstances relating to the text type, fidelity to the text, deliberate practice and focus on linguistic details.

In the next chapter we will explore the potential role of working memory in internalizing a long text, such as the Quran.

Chapter 3

Working memory: structure, processes, and functions

3 Introduction

Research on memory (e.g. Broadbent 1958; Atkinson and Shiffrin 1968; Tulving 1972) has suggested that there are two distinct memory systems: (a) short-term memory (STM) and (b) long-term memory (LTM). STM is a conscious, immediate or primary memory system of limited storage for a short duration of time. LTM, on the other hand, holds an unlimited amount of information relatively permanently. It is worth mentioning that STM is perhaps better viewed as more of a processing mechanism than a storage unit (see below; also chapter 4).

An early model of short term memory (Atkinson and Shiffrin 1968) proposed that STM receives information filtered through sensory registers, that is, the five senses. Atkinson and Shiffrin reasoned that information has to be constantly rehearsed to stay in short term memory as well as to transfer to long term memory. According to them, short term memory operated as workspace in relation to information flow and processing. Atkinson and Shiffrin's model assumed that rehearsal and storage of information in STM was enough for learning to occur. The model was challenged by 'levels of processing' theory (Craik and Lockhart 1972) which posited that learning occurs as a result of how material is processed rather than simply to rehearse it in STM. For example, while sometimes we remember information without rehearsing, at other times we are not able to recall it despite rehearsal (see chapter 4). Moreover, Shallice and Warrington (1970) showed that there are patients with intact long term memory and with normal and efficient reasoning and comprehension abilities despite an impaired short term store, indicating that short term memory is neither necessary for transferring information into long term memory nor functions as working memory (see below).

The above notion of STM as working memory oversimplified the working of and the relationship between short- and long-term memory systems. Perspectives on short term memory, however, changed again with the landmark work of Baddeley and Hitch (1974), in which they reinstated working memory in a new way. They reasoned that short-term memory

was not just a 'store' of information but a workspace for various cognitive operations involved in reasoning and comprehension. They introduced the concept of working memory (WM) which, according to them, was made up of several systems. Lying between sensory and long-term memory, information enters working memory from the environment through sensory memory. By means of some cognitive action, information is transferred from WM into long term memory (Baddeley 2010).

It is important to note that in Baddeley's model, STM is conceived of as a sub-part of WM and the terms 'STM' and 'WM' are not interchangeable. In this chapter, therefore, I will be looking at the role of working memory in memorizing the Quran, with (verbal/phonological) STM as just one part of it.

The Quran is memorized for long term recall and as it is remembered over the long term, we would naturally assume that it ends up in LTM. The questions that we want to answer are:

(1) What is the role of working memory in Quran memorization?
(2) Are Quran memorizers involved in something deeply cognitive to hold the text over long intervals?
(3) How does the Quran text get in long term memory?

To answer these questions, this chapter will investigate the structures/components and operations/functions of working memory chiefly in relation to Baddeley's model.

At the end of the chapter we will be able to ask:

How would memorizers have to deploy WM in order to get the Quran text into LTM?

3.1 An overview of the multicomponent model of working memory

Working memory, according to Baddeley (2010) is: "a system that not only temporarily stores information but also manipulates it so as to allow people to perform such complex activities as reasoning, learning, and comprehension" (p. 19). In this view, working memory

supports everyday activities ranging from remembering a telephone number to any complex cognitive task. Baddeley (2000) aptly observes that the concept of working memory emphasizes the "function of such a system in complex cognition, rather than memory per se" (p. 417). Rather than just being a passive store for holding a certain amount of information for a limited time, working memory has been conceptualized more broadly, as not only storing and manipulating relevant information and inhibiting irrelevant information, but also "acting on the contents of short-term memory" (Moulin and Gathercole 2008, p. 307).

Instead of a unitary and general-purpose working memory as conceived in the Atkinson and Shiffrin (1968) model, Baddeley and Hitch modelled working memory with specialized systems, such as a phonological loop, and a visuo-spatial sketchpad, dealing with verbal and visuo-spatial information, respectively. Both sub-systems are of limited capacity and are independent of each other i.e. they don't interfere with each other's working. The evidence for the specialized nature of the phonological and visuo-spatial components comes from memory tasks involving a secondary visual or verbal task. It was found that a secondary visual task interferes with memory for primary visual information, whereas a secondary verbal information task interferes with memory for primary verbal information. On the other hand, a secondary visual task doesn't interfere with a primary verbal task, and a secondary verbal task doesn't interfere with a primary visual one (Baddeley 1997; 1999).

The specialized and independent nature of the two components has also been emphasized by neurological studies where groups of patients with memory problems show opposite patterns of impairments. Shallice and Warrington (1970), for example, described a patient with memory span of only two digits, and with a much reduced recency effect (i.e. impaired memory for items at the end of the list) in free recall. On the other hand, the patient had a preserved long term memory and showed better recall for visually than auditorily presented items. According to Shallice and Warrington, the patient's memory performance was evidence of a defective phonological short-term memory. On the other hand, his better memory for visual information suggested the independence of the visual short term memory component. Vallar and Baddeley's (1984) study of a patient suffering from selective phonological memory deficit also supports the above results.

A third general-purpose component called the central executive is assumed to supervise and regulate activities in the three subordinate components. A fourth component, an episodic buffer, was added later to the model (Baddeley 2000; Baddeley and Wilson 2002) and was

meant to explain the language performance of patients suffering from short-term memory deficit (see below).

Fig 3.1 shows Baddeley's multi-component working memory model, highlighting the relationship between working memory and long term memory. The episodic buffer is assumed to be multi-dimensional in nature and provides a temporary interface between the phonological loop, the visuospatial sketchpad, and LTM. The phonological loop has been shown as a linguistic mechanism.

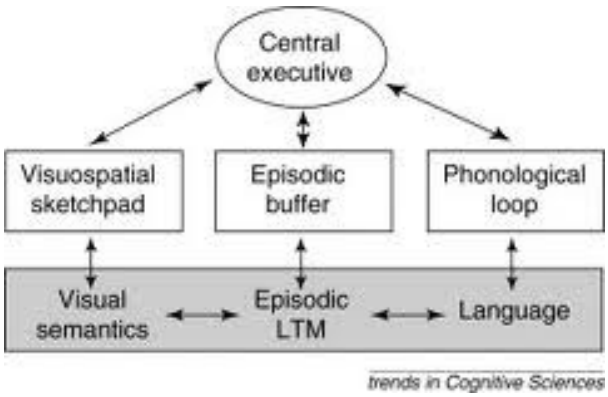


Figure 3.1 Baddeley's model of working memory (From Baddeley 2000)

In the following sections the various components of working memory will be explored in some detail in relation to what their roles in text/language processing might be in Quran memorization.

3.1.1 The phonological loop

The phonological loop is the most extensively researched part of working memory and is assumed to be composed of two components: the phonological store and the articulatory rehearsal system. The phonological store holds information in speech-based form and has been referred to as the 'inner ear'. In other words, the loop deals with phonological input and phonological output. It is important to note that the phonological loop is a linguistic mechanism and is also called verbal STM. The articulatory system is responsible for vocal or sub-vocal (i.e. internal 'whisper') rehearsal and is referred to as the 'inner voice' (Baddeley and Lewis 1981).

As the account below will demonstrate, research over the years has established four important characteristics of the phonological loop or verbal STM: (a) the information it holds is acoustically/phonologically encoded; (b) it has limited capacity with regard to the amount of information it can hold; (c) it can hold information for a limited duration only; (d) it is sensitive to word length.

Thus, unlike long term memory which is primarily concerned with and is based on meaning (see next chapter), the nature of information in short-term memory is phonological. Conrad (1964) demonstrated experimentally that STM translates a visual code into an acoustic one. For example, when presented with an array of letters visually, participants, on immediate recall, would more often recall "D" for "E", than "F" for "E". According to Conrad, the errors in the recall of the visually presented letters were based on the sound rather than the appearance, suggesting that the participants had selected the sound rather than shape of the letter for storage in the STM. In another study, Wickelgren (1965) visually presented his participants with four letters. He then distracted them by making them copy eight different letters, after which they were asked to report the original letters. Results showed that recall was decreased when the four letters rhymed with the eight distractors, indicating that STM is encoded phonologically, even when the input is visual.

The phonological nature of STM has also been demonstrated by a well-known phonological similarity effect (Baddeley 1966 a; b). In a classic experiment Baddeley (1966 a) presented his participants with 24 sequences of five words in two conditions for immediate order recall. In condition A, 12 sequences of acoustically similar words, such as *mad, man, mat, cap, cad, can, cat, cap, max, map* and 12 sequences of acoustically different words drawn from a set of equally frequent words, such as *cow, day, bar, few, hot, pen, sup, pit, rig, bun* were presented. In condition B, 12 semantically similar sequences, such as *big, long, broad, great, high, tall, large, wide, fat, high,* and 12 sequences of semantically different *old, deep, foul, late, safe, hot, strong, thin, good, huge* drawn from words of equal frequency were presented. Participants heard the sequence at a rate of one word per second. Words written on cards were available during the test sessions so the participants had only to remember the order of the words in a sequence and not the words themselves. Performance was marked as percentage correct sequences. Baddeley's findings showed a large phonological similarity effect: only 9.6% of the phonologically similar sequences were correctly recalled in contrast to 82.1% in the control condition. Semantic similarity, on the other hand, had a small effect: in the semantically similar condition 64.7% sequences were correctly recalled as opposed to

71% in the control condition. Baddeley concluded that information was phonologically coded, because participants confused items that were phonologically similar, i.e. items with "fewer distinguishing features" (Baddeley 2010, p. 28). In another study Baddeley (1966 b) tested the effect of phonological and semantic similarity over the long term. Participants were presented with four lists of 10 words of equal frequency, that were, respectively, acoustically similar, acoustically dissimilar, semantically similar and semantically dissimilar. In the immediate condition, i.e. just after hearing the words, participants were given 40 second to write down as many of the words as they could recall in the order of presentation. In the delayed condition, after each presentation of a list, participants were engaged in a distracting task for 20 minutes involving immediate recall of 8 digits. They were then asked to write down as many of the ten words (the ones already tested) as they could in the given order. According to the results, while short term memory was impaired by acoustic/phonological similarity, long term memory was impaired by semantic similarity.

Kintsch and Buschke (1969) also studied the effect of phonological and semantic similarity on short term retention. In a semantic similarity condition, participants were presented with two lists in a random order: one list was made up of 16 unrelated words (i.e. semantically dissimilar) while the other consisted of 8 pairs of related words i.e. synonyms. In the phonological similarity condition, words were either homophones i.e. phonologically similar or were phonologically dissimilar. Items were presented orally one at a time. After the list had been presented, one of the items on the list was used as a probe and the participant was asked to report the word that immediately followed it. According to Kintsch and Buschke's results, short term memory was impaired for the last few words when they were phonologically similar or homophones. Their interpretation was that phonological similarity led to phonological interference disturbing the recall. In contrast, items from earlier part of the lists were affected by semantic similarity.

The above account shows that one of the most basic differences between short and long term memory (see chapter 4 for a full account of LTM) is that each memory system processes information differently. STM is phonologically encoded and, therefore, suffers from phonological similarity effect. LTM, on the other hand, is semantically encoded, and suffers from semantic interference. The studies above, however, look at STM in the context of a language one knows. That is, although these studies are talking about phonology, the materials being tested are not meaningless words but words with meaning known to the participants. It is, therefore, difficult to separate the effect of semantics on short term memory

of the participants. For example, when memorizing in a language people do not understand, they are not likely to confuse semantically similar words, such as ‘woman’ and ‘girl’, or ‘hand’ and ‘foot’.

Research indicates that working memory can hold only a limited amount of information. Miller’s (1956) influential paper concluded that people can generally process up to seven plus or minus two items; once the number exceeds seven, people make mistakes in recall. He, however, noted that the capacity for holding and processing information can be enhanced by recoding the information into chunks—higher order units of information. Stringing several pieces of information into one larger unit or chunk takes up less space in STM than individual, disparate and isolated items. For example, the nominal digits 7,8,3,5,2,1,0 might be recoded into chunks, such as 78, 35, 210 or any other size depending on the subjective organization of the individual. The number of chunks, however, typically remains the same, that is, seven plus or minus two units of information.

Chunking operates in natural languages at all levels and is reliant on long term semantic knowledge, such as meaning, word order etc. Native speakers of a language, for example, can chunk letters, sounds, words, phrases and clauses into predictable and regular patterns on the basis of their knowledge of the language. They learn these sequential probabilities through wide exposure to language in a variety of communicative contexts (Ellis 2001). In STM testing, chunking relies on this existing knowledge. The capacity of STM thus tends to get smaller for nonsense syllables, unfamiliar words, and digits in foreign language because one has to remember both the items and their order of presentation (Baddeley 2010, p. 21).

Research suggests that material showing structural regularities of natural languages lends itself to chunking more than absolutely random combination of nonwords. Epstein (1961 quoted in Ellis 2001, p. 23) has illustrated the point through the following examples: A *vapy koobs desaked the citar molently um glox nerfs* is more easily remembered and recalled than *koobs vapy the desaked um glox citar nerfs amoletenly.* This is because the former string of ‘words’ approximates English syntax and can, therefore, be more readily committed to memory.

Gathercole (1995) found that familiar nonword phonemic sequences, such as “bannifer”, “stopograttic” , “stirple”, and “blonterstaping” were easier to recall than less familiar nonword phonemic sequences, such as “kipser” and perplisternok”, suggesting the impact of existing language knowledge on learning novel words. Although nonwords from both

categories are strings of nonsense syllables, they vary in their approximation to regular English word structure, affecting their learnability: the more a word or a nonsense syllable deviates from the regular structure of a language, the more difficult it becomes to remember it. Internal structure and associative value are important characteristics of verbal material, determining its differential learning and retention. In other words, syllables which are not English but have the feel and ease of English, because they can be pronounced and associated with existing or known English words, are easier to learn as opposed to syllables which are impossible to pronounce and/or associate with English words. Word-likeness is thus a strong predictor of chunkability and relative learnability of verbal material. According to Ellis and Sinclair (1996):

> The novice FL learner comes to the task with a capacity for repeating native words. The degree to which the relevant skills and knowledge are transferable to immediate FL word repetition depends on the degree to which the phonotactic patterns in the FL approximate to those of the native language (p. 244).

French and O'Brian (2008) studied French-speaking children's performance at Arabic and English nonword repetition tasks at the beginning and end of a five-month ESL programme. Although performance at both tasks was indicative of high language learning, only performance on the English nonword repetition task increased with time. They reasoned that the increase was due to the effect of classroom training in English phonotactics: learners were trained in the lexical, phonological and prosodic properties of English which led to a greater long-term knowledge/representation of these properties and, in turn, resulted in an increased phonological memory performance as measured by nonword repetition.

The above account has shown that phonological memory can be trained to improve its processing efficiency. When a person is already familiar with the sound and structure of a language, it is easier for him to process information in that language than in a language he has not heard in. It suggests that in order to efficiently memorize the text in Classical Arabic, the non-Arabic speaking Quran memorizers may have to have some familiarity with the text before they start memorizing it. I will return to this issue in the discussion section of this chapter.

It is commonly agreed that STM holds information for a short time i.e. for about 2 seconds or so (Baddeley et al 1975). Information has to be constantly rehearsed, if it is to be kept any longer in short-term memory. Auditory information finds direct access to the store, whereas visually presented information can be converted into acoustic information by means of vocal or sub-vocal articulatory rehearsal (see above). The rehearsal, however, can be subverted by articulatory suppression—a process whereby the rehearsal is thwarted by pronouncing an irrelevant word, allowing the memory trace to slip away (Vallar and Baddeley 1982). In other words, articulatory suppression prevents visually presented information from converting into a phonological code, and thus blocks it from entering the phonological store.

Evidence for the role of rehearsal to keep a memory trace from decaying was provided by Brown (1958) and Peterson and Peterson (1959) who, in separate experiments, demonstrated that a memory trace from short-term memory fades when attention is diverted and rehearsal is prevented by a distracter task. Peterson and Peterson, for example, showed their participants a trigram i.e. a three-letter consonant string, such as ACW and asked them to remember it. Participants were then engaged in a distracting task of loudly counting backwards in threes from the number shown to them, e.g. 500, 497, 494, etc. They were then asked to recall the trigram at various delays, such as 3, 6, 9, 12, 15 or 18 seconds. The results showed that at a 3-second interval the recall was slightly above 50%, whereas at 18-second interval the recall had dropped to 5%.

Given the phonological nature of STM, the non-Arabic speaking Quran memorizers have to constantly and persistently repeat the text. According to Craik and Lockhart (1972), there are two types of rehearsal: maintenance rehearsal and elaborative rehearsal. These two types of rehearsal lead to two different types of representation in memory: while maintenance rehearsal leads to superficial representation without any recourse to meaning, the elaborative rehearsal establishes a relationship between the material being rehearsed and the already existing meaning system. Information stored at a superficial level by means of maintenance rehearsal is subject to rapid loss, whereas material encoded at a deeper semantic level will be available over the long term (see chapter 4 for more discussion on this).

So it is important to know what kind of rehearsal the Quran memorizers are involved in. If they are engaged in maintenance rehearsal (i.e. superficial rehearsal), the memorizers will be able to remember the Quran as long as they rehearse it. The moment they stop rehearsing it or are distracted, the text will be forgotten. If on the other hand, the memorizers are engaged in

some deep cognitive operations via elaborative rehearsal, they will be able to retain it in memory. However, an interesting question arises here. How can they be involved in elaborative rehearsal when they don't know the meaning of the text? Chapter 4 will seek answers to these questions.

Research has also demonstrated that the phonological loop is sensitive to word length: immediate memory span decreases with the increase in word length. Baddeley et al (1975) found that in serial recall, one-syllable words, such as 'sum', 'wit', 'hate' etc., showed better recall than five-syllable words, such as 'university', 'opportunity' etc., in both visual and auditory presentations. This would appear to be contrary to chunking theory, since the longer words were syllables that were bundled into single units of meaning. According to Baddeley et al, it was the articulatory duration rather than the number of syllables in a word that caused the word length effect. For example, two -syllable words of short duration, such as 'wicket', and 'bishop' showed better recall than two-syllable words of longer spoken duration, such as 'harpoon', and 'Friday'. This suggests that recall depends on the rate of articulation: longer words take longer to rehearse, leading to their faster decay and consequently lower recall, compared to short words. This effect has been found to contrast across languages: some languages have longer spoken words than others. Ellis and Hennelley (1980), for example, demonstrated that Welsh digits take longer to say than their English counterparts, leading to smaller digits span in Welsh than in English. They attributed these differences in performance on the digit span between the Welsh children and American children of the same age to bilingual word-length differences rather than STM capacity or intellectual differences.

There is however an issue with the above account. It is, once again, the role of semantics. The words presented to participants were not just phonological forms: participants, being the native speakers of the language, knew the meanings too. So we don't know if the same effect would hold true for participants tested on material in a foreign language, that is, when stimulus is just a phonological form. However, research on nonword repetition (Gathercole & Baddeley 1989, 1990) shows that short term memory span is greater for shorter than longer nonwords, as the former are more accurately reproduced than the latter. In a longitudinal study, Gathercole et al (1991) tested repetition accuracy in children of three age groups i.e. 4-, 5-, and 6-year-olds. They found that, across all three groups, repetition accuracy decreased with an increase in the nonword length. According to Gathercole et al (1991):

> One factor widely associated with phonological memory - the number of syllables in memory items -strongly and consistently affected repetition performance of all three age groups. The longest nonwords were associated with lowest repetition accuracy, and repetition performance deteriorated as nonwords increased from two to four syllables in length (p. 363).

The account so far has focussed on the structure and role of the phonological loop in memorizing and remembering information. It was clear that due to the acoustic nature of information in the phonological loop, as well as the loop's limited capacity and the duration over which it can hold information, the phonological loop may not be the primary or only mechanism for remembering the Quran. Quran memorizers, however, do not need to depend on the phonological input or sound code alone. We saw in chapter 1 that in addition to the sound, the memorizers have the text available to them in printed form. It is, therefore, important to examine whether the visual stimuli/input, that is, words on page, can help them remember the text they don't know the meaning of. To investigate this, I will explore the role of another component of working memory i.e. visuo-spatial-sketchpad.

3.1.2 The Visuo-spatial Sketchpad

The visuo-spatial sketchpad (VSSP) is the second component of working memory and is responsible for processing visuo-spatial and kinaesthetic information into a unified representation.

Logie (1995; 2003) has proposed a dipartite structure which corresponds with the structure of the phonological loop. He has divided the VSSP into two parts: (a) the 'visual cache' is responsible for storing information about form, colour and the location of the perceived object. This corresponds with the phonological store of the phonological loop; (b) the 'inner scribe' is responsible for storing spatial relationships of body movement and is also involved in active rehearsal by mentally visualizing the objects and the spatial locations. This corresponds with the articulatory rehearsal process of the phonological loop.

Studies on the processing and retention of visuo-spatial information show that the VSSP, like its phonological counterpart, is of limited capacity (it can typically hold three to four objects) and can hold information for a limited time (Baddeley 2003, p. 833). Moreover, visual and

spatial information (i.e. appearance and location of objects, respectively) share the same cognitive resources.

The role of imagery in memorizing and remembering information can be explained in the light of Paivio's (1971, 1991) dual coding theory of cognition which assumes that there are two distinct systems that represent information (i.e. verbal representations and mental images). In Paivio's model, while the verbal system specializes in processing verbal information (language), the nonverbal system specializes in processing (imagery). These systems are modality-specific and work not only independently but also cooperatively. According to Paivio, information in both systems can have additive effects on recall. In other words, a stimulus encoded dually i.e., both verbally and visually/pictorially, results in better recall compared to single modality presentation. On this view it can be argued that memory for language/text can be enhanced by making two representations of words, that is, the phonological representation (sound) and the orthographic representation (written). Both systems feed into each other, strengthening the memory trace.

The dual coding theory offers a theoretical explanation for the superior recall performance of imagery based mnemonic techniques, such as the keyword method which involves both phonological and pictorial codes, compared to rote-learning which is dependent on verbal repetition alone (see next chapter). This means that a rich and elaborate experience with the stimulus, that is, coding it at two levels, will lead to a rich representation of the memory trace. Encoding a stimulus at two levels will provide two retrieval paths, enhancing and strengthening the recall**.** We will return to this in the discussion section at the end of this chapter.

What might the VSSP and dual coding mean for the Quran memorizers? The literature suggests that learners might make a strategic use of the visual input to remember information, because visuals give an 'extra' link or hook to hold onto it. Can the Quran memorizers strengthen the transient phonological input with the help of the visual input i.e. the location of the printed words on the page? Do the Quran memorizers actually memorize the visuals and read them off in their mind when reciting. Does it mean that the visuals serve as a sort of mnemonic hook for phonological information and get rid of the need for a semantic hook? The discussion section of this chapter will consider this matter.

3.1.3 The central executive

The central executive (CE), was part of the original model, and although binding information from the phonological loop and the visuo-spatial sketchpad into coherent episodes was one of its functions, the executive did not contain short-term store capable of holding complex multimodal representations. Hence the need for a multimodel short term memory store was felt (see below). According to Baddeley (2003), the central executive "is assumed to be responsible for the attentional control of working memory" (p. 201). As the name suggests, it is assumed to manage, organize, update, manipulate and effectively control all information in working memory. Unlike the phonological and visuo-spatial components which are responsible for domain specific tasks and are independent of each other, the central executive supervises and integrates information in these stores. Also, the central executive takes the integrated information from the episodic buffer and interprets it. It also links working memory with the LTM and chooses between relevant and irrelevant input (hence Baddeley's reference above, to the attentional aspect). The CE does not have a storage capacity of its own; it rather uses information from the component systems. It connects to LTM through the episodic buffer (Baddeley and Wilson 2002, p. 1737). According to Ashcraft (2006), the central executive's functions include "language comprehension, reasoning, and storage and retrieval operations involving long-term memory" (p. 193).

If the Quran memorizers are juggling and weaving together various information in their mind to keep a detailed and integrated memory trace of the text, they will need to allocate a great deal of processing for this purpose. If their recall is both phonological and visuo-spatial, then they have to make use of the executive and attentional system so that they recall from the page in their mind's eye. Presumably, substantial cognitive resources would be needed to process, integrate and maintain a coherent but complex memory of the text. This role of the central executive is especially important in the recall. If their recall is a conscious act in that it is based on vivid episodic memory, then, when they make an error in recitation, it might be possible for them to 'notice' the error and correct themselves as their executive attentional system will direct their attention towards it. This would be a very valuable ability, given the need for faithful recall.

The working memory model of Baddeley and Hitch (1974) is an integrated system and it may help shed light on Quran memorization. While the phonological loop alone is insufficient to

explain Quran memorization, the VSSP and the episodic buffer combinedly and cooperatively might account for memorizing and recall of the text.

3.1.4 Episodic Buffer

Baddeley and Hitch's (1974) model, despite accounting for a variety of data, was unable to neatly explain a number of phenomena. According to Baddeley and Wilson (2002), the main problem with the model was that it failed to explain how WM is related to LTM, and how information from different sub-systems of WM is integrated. For example, the memory span for unrelated words is five or six, whereas the memory span for words in a sentence is fifteen or more which is beyond the capacity of the phonological loop (Baddeley 2010). As we saw earlier, this beyond-the-usual storage of words in the phonological loop can be explained in terms of 'chunking'—the process of chaining together words into a chunk (i.e. a higher unit of information), facilitated by syntactic and semantic information from long term memory (section 3.1). The problem however relates to how WM is connected to LTM so as to make use of this information in laying down permanent long term memory traces.

To explain the relationship between working memory and the LTM, the earlier model was reformulated and a fourth component, i.e., the 'episodic buffer' (Baddeley 2000) was proposed. In an experiment, Baddeley and Wilson (2002) showed that severely amnesic patients with a significant phonological loop deficit were still able to have good short term prose recall, exceeding the limit of the loop. According to Baddeley and Wilson, the recall performance of these patients could not be explained in terms of phonological memory as their word span was limited to one or two words, nor could it be explained in terms of support from the LTM, which was impaired in these patients. Their explanation was that information is stored in a 'buffer' and an intact executive capacity does the processing on the contents of the buffer (p. 1741).

According to Baddeley (2010), the episodic buffer is a limited-capacity back-up store, drawing information from different stores and keeps it in the form of an integrated episode in a chronological order, like the memory of a movie scene or a story. Pulling information from different and independent sensory channels is assumed to bind or link features to the objects. For example, perceived features like colour, smell, and size are integrated with objects to

"allow the world to be perceived as comprising a coherent array of objects" (Baddeley 2000, p. 421).

In the above view, the episodic buffer is assumed to be multi-dimensional in nature, that is, unlike the phonological loop and the VSSP which hold specialized codes, the episodic buffer has the capacity to hold and combine limited information in multi-dimensional or multi-modal code. And precisely because of its multi-dimensionality, the buffer "is capable of acting as a link between the various sub-systems of working memory, also of connecting these subsystems with input from LTM and from perception" (Baddeley 2010, p. 56).

In the light of how the episodic buffer works, will it be possible to say that Quran memorizers make an integrated but concrete (episodic) memory trace of the text on the basis of combined (i.e. multi-modal) representation from information in the phonological and visuo-spatial stores? This question is discussed below.

3.2 Discussion

In this chapter we focused on the structure, processes, and functions of working memory in relation to the Quran memorization. The literature reviewed has indicated the following key findings. In what follows, these findings will be discussed.

- Familiarity with the sound and structure of a foreign language may result in efficient memorization and recall in that language.

- Encoding information at more than one level results in a stronger memory trace as compared to encoding information at one level.

The literature suggested that working memory is a means of acquiring information from sensory channels. Working memory is phonological in nature and only accommodates a limited amount of information which if not rehearsed fades away quickly. It was noted that although the capacity of working memory is normally limited to seven plus or minus two elements of information, it can be increased by organizing information into units of higher order.

The literature suggests that familiarity with text enables a learner to chunk (i.e. create higher-order units of information) which is vital for efficient memorization: chunking increases processing efficiency. Although it is typically assumed that knowledge of the language system and meaning is necessary for chunking in relation to committing information to memory, it may not be absolutely essential. Chunking can be the result of perceptual relatedness too. Someone who knows nothing at all of the language, except the phonology and/or orthography, is obviously at a disadvantage (in terms of encoding and recall at will) as compared to a proficient speaker who can exploit natural sequential associations inherent in a language to form chunks. One can, however, use other cues to chunk and commit text to memory. Familiarity with the sound and structure of a language may be one such cue. In addition, features such as word-likeness, phontotactic similarity, and frequency of occurrence, also help in chunking and committing text to memory.

Sounds that are chunked 'meaningfully' might be easier to articulate than sounds without any pattern. What the Quran text provides is not just irregular 'words' but 'words' with regularity of sound pattern. Once the learners find a way into the phonology of the language, might it be possible for them to sequence sounds according to the phonotactic structure of the language? They could then store sequences of sounds in a patterned way. Quran memorizers' memorization might thus benefit if they are already familiar with Arabic phonology and script.

Meanwhile, repetition and rehearsal is the means to keep the information 'at hand'. For the Quran text to be remembered over short and long periods, memorizers have to engage in constant repetition. However, the literature suggested that the Quran memorizers might support and enhance their short term phonological memory by the visuo-spatial imagery of the text. In other words, they will be mapping sounds of the words onto visuo-spatial details—image, colour, font size and location of the text on the page. This is an important idea, implying that in the absence of linguistic meaning, the visual and spatial information may provide a means to hold text in memory. 'Meaning' therefore needs to be broadly defined. That is, semantics derived from lexis and grammar are just one kind of 'meaning' that might be able to anchor memory. Quran memorizers might thus use visuals and other features of the text to compensate for linguistic meaning as a hook in memory (see chapters 4 and 6 for more discussion on this).

The literature also suggests that coding information at several levels leads to a rich representation of the memory trace as the text will then be available in several codes: phonological/articulatory, acoustic, and visual. All a memorizer has to do is to weave all this information into a unified whole using the episodic buffer and central executive. Given that Quran memorizers have the text available to them in both phonological and written forms and that they also hear themselves while reciting the text, the literature reviewed in this chapter suggests that they will have encoded the text at all these levels to make a multi-modal and detailed memory. Encoding the Quran at multiple levels will enhance the chances of successful retrieval.

However, although the literature suggests that memorizers might buttress/support their fleeting phonological memory by means of visuo-spatial mnemonic hooks, it does not shed light on the blind memorizers' memory of the text. What do the blind memorizers do to shore up the phonological memory? How do they remember the text in the absence of both meaning and visual details? To answer these questions we need to ask both sighted and blind memorizers about what they do to memorize and retain the text. Chapter 5 will report on the Quran memorizers' interviews with regard to their practices of memorization.

When we entered this chapter, we wanted to know how the Quran memorizers might be deploying working memory/phonological memory to help them internalise the entire Quran. What this chapter has suggested is that phonological memory on its own would be inadequate because it is associated with STM. Information encoded phonologically is of limited duration and the quantity of material is very limited. In the next chapter we will approach the issue from the other end. If it is assumed that the Quran text ends up in LTM, how does information get encoded there, and does Quran memorizing meet the conditions for LTM storage, as typically understood in the research literature?

Chapter 4

Long-term memory: representation and retention of information

4 Introduction

In chapter 3 the discussion focussed on the role of working memory (WM) as a means of memorizing text, especially in relation to the Quran text. It was noted that WM is the gateway to acquiring information: the sub-systems of WM provide different channels for gathering information in different modalities, leading to a richer representation in memory. It was, however, highlighted that information in WM is retained up to a few seconds only, so to lengthen the duration, one has to engage in constant rehearsal. While repetition might be a part of the memorizers' way of remembering the Quran, it cannot be the only mechanism for doing so. We therefore need to understand what else the Quran memorizers might require to make a durable memory trace of the text. What does the literature say on the long-term availability of information? The focus in this chapter, therefore, will be on long term memory (LTM), where the Quran text appears to end up.

The account in this chapter will be guided by Baddeley's (1999) observation that LTM "is primarily concerned with storing information, unlike sensory and short-term memory where storage is an incidental feature of other aspects of the system" (p. 16). Baddeley regards LTM as a storage mechanism where information is stocked for future use at will. Short-term memory, on the other hand, primarily deals with other aspects, such as attention, learning, reasoning, and comprehension.

In this chapter I will be looking for answers to the following question.

How do Quran memorizers succeed in lodging the entire Quran text in long term memory, even though they do not (appear to) use semantic means to encode it?

In order to assemble elements of the answer to this question, some more basic questions need to be answered, and they are listed below. As the narrative progresses, key findings that contribute to the answer will be enumerated. At the end of the chapter this set of findings will

be relisted, as the basis for a discussion of how they interrelate and what they mean for the Quran study. The questions that will steer the narrative of this chapter are:

(1) How does information get into long term memory?

(2) What are the main parameters for successful and less successful lodging of information in long term memory?

At the end of the chapter, it will be possible, using the various findings assembled, to ask:

(a) According to current research knowledge, what would Quran memorizers have to be doing, in order to integrate the Quran text in long term memory?

(b) Or, if it is not feasible that the Quran memorizers are able to do this, is it possible that the Quran is in fact not stored in long term memory?

4.1 The biological basis of memory

As key reference texts (e.g. Shallice and Cooper 2011; Pinel 2003; Neath 1998) indicate, a great deal of research has been done on locating cognitive functions in various regions of the brain. Penfield and Rasmussen's (1950) and Scoville and Milner's (1957) works contributed significantly to identifying brain areas involved in memory. Literature on the memory/brain relationship ranges from studying the working of a single brain neuron to the functioning of different brain structures. Various branches and sub-branches of neurosciences, such as neurobiology, neurophysiology (the branch of neuroscience dealing with the relation between brain functions and behaviour by examining patients suffering from specific brain damage), and neuroanatomy etc., have studied neural and anatomical mechanisms at cellular, molecular, and structural levels in the brain in relation to memory functions (see Fig 4.1 below). Different neuroimaging techniques, such as Positron Emission Tomography (PET) and Functional Magnetic Resonance Imaging (fMRI) have immensely contributed to the understanding of the underlying neuroanatomical structures implicated in different types of memory by observing and analysing brain activity during various memory functions (Nyberg and Caeza 1999, p. 501).

Neurons, the building blocks of the nervous system, are cells that process and transmit information. The nervous system is composed of three kinds of neurons. (a) Sensory neurons take and translate a sensory message into a neural message, and send information through the nervous system; (b) motor neurons transform neural messages into muscular contractions necessary for movement; (c) interneurons comprise the bulk of the nervous system, and send messages along the system i.e. between neurons. The human brain is composed of billions of these neurons but they do not make a continuous link. A neuron consists of multiple branches called dendrites and a long, thin extension called an axon. A neuron contacts another neuron by means of dendrites at a point of near contact. That is, neurons do not physically touch; rather they have small fluid-filled gaps between them called synapses (Anderson 1995, p. 34). The communication between different neurons take place by means of a chemical action in which an axon releases a substance called a neurotransmitter to activate the next neuron. The connection between neurons provides the physical basis of learning and memory. Neuron A sends a signal to stimulate a neuron B next to it, inciting a response from neuron B. The process of stimulation and response between neurons results in durable structural changes in neuronal connections. This phenomenon is known as long term potentiation (LTP). The repeated activation strengthens neural links and makes them more permanently entrenched in the cortical areas in which they were first registered (Gluck et al 2008).

An important characteristic of the human brain is it plasticity. The term 'plasticity' refers to the ability of the brain to change and reorganize neural connections, according to new learning, experience and exposure to different conditions. It is generally believed that neural plasticity decreases with age. A child's brain appears to be more plastic and supple than an adult's, giving itself more easily to changes and reorganizations in the neural pathways, resulting in learning. According to Pascual-Leone et al (2011):

> The mechanisms of plasticity, and […] the balance between local and network plasticity, change over the lifespan. In the young brain, local cortical plasticity appears to be higher, and cross-sectional studies suggest that it decays with age (p. 311).

With regard to memory and learning this means that as people grow older, they find it harder to lay down new memories. It is generally assumed that the same applies to deliberate memorization, so that the earlier Quran memorizers begin, the easier they will find the task (see chapter 5). Memorization early in life thus has implications in terms of outcome.

The human brain can be divided into three major regions: the hindbrain, the midbrain, and the forebrain (Neath 1998, p. 187). The hindbrain, also called the brainstem, is common to all mammals. It is located at a lower physical level relative to other parts of the brain, and governs basic primitive functions such as breathing, digestion, circulation etc. The midbrain, also known as cerebellum, is responsible for reflexive responses, physical action and motor-movement. The forebrain, specific to humans and most recent in evolutionary development, lies at the top of the brain and is associated with 'complex thought and cognition' (Neath 1998, p. 189). Sitting on the top of the forebrain is cerebrum which is covered by a wrinkled surface called neo-cortex or cerebral cortex, containing two-thirds of the brain neurons. The cerebrum is divided into two halves, called hemispheres i.e., the left and right cerebral hemisphere. Each hemisphere is further divided into four lobes.

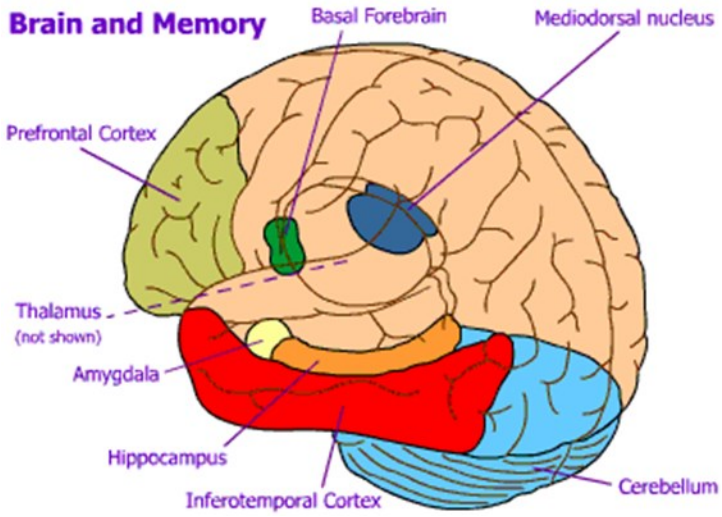
Key to brain functions

1 Basal Forebrain involved in thought and cognition

2 Prefrontal Cortex involved in working memory and executive control

3 Thalamus functions as a gateway for receiving sensory information and sending it to cortical regions for processing

4 Amygdala involved in emotional learning and emotional memory



5 Hippocampus responsible for memory formation

6 Inferotemporal cortex responsible for visual object recognition

7 Cerebellum responsible for reflexive responses, physical action and motor-movement.

8 Mediodorsal nucleus involved in attention, planning and organization.

Fig 4.1: A view of brain structures important for memory functions
(http://www.learnplus.com/guides/learning-sys-memo.html**)**

Research on the role of the two brain hemispheres in language perception and control generally indicates that language is a function of the left hemisphere. This position has a great deal of experimental support behind it from studies on aphasia where language loss has been found to be the result of damage to the left hemisphere. Results from studies on brain neuroimaging provide further support for left hemispheric specialization for language. However, research has indicated that the right hemisphere might also play a role in language processing. Wray (1992) reviewed literature suggesting the involvement of the right hemisphere in memorized, non-propositional or automatic language. As Lindel (2006) puts it:

> This form of expressive language involves the holistic construction of automatic, formulaic, and context-bound-utterances (e.g., counting, nursery rhymes, days of the week); verbalizations that neither involve the generation of new ideas nor the processing of such ideas into original, grammatical utterances (p. 133).

Underneath the cerebral cortex are a number of subcortical structures such as the thalamus, the basal ganglia, the hippocampus, and amygdala. All these structures have important roles in performing various memory functions. The thalamus plays the role of a gateway which receives sensory information through five senses (sight, sound, touch, smell and taste) and then sends the information to "cortical regions specialized for processing particular sensory stimuli […]. Such areas, collectively called *primary sensory cortices*, are the first stage of cortical processing for each type of sensory information (Gluck et al 2008, p. 54, italics in the original).

The hippocampus, a brain structure in the medial temporal lobe, has been attributed a critical role in memory formation especially in the acquisition of declarative memory i.e. episodic (events and auto-biographical) and semantic memory i.e. facts and general knowledge (Gluck et al 2008). Studies of brain patients with a damaged hippocampus (Scoville and Milner 1957; Corkin 1984) have been very productive in shedding light on its role in memory formation. In a well-known study, Scoville and Milner (1957), in order to cure the epilepsy of a patient called H. M., surgically removed the bilateral temporal lobe of his brain including the hippocampus. Although H. M's epilepsy was controlled, the removal of the hippocampus caused him anterograde amnesia, that is, he could not commit new information to his declarative memory. However, he showed intact perceptual, motor learning as well as working memories capacities. According to Nader, Schafe and LeDoux (2000), short term memories are converted into long term memories by a process called consolidation. In the

process of consolidation, memory representations are transferred from hippocampus to neocortex (p. 217), involving the synthesis of new proteins within the neurons. Squire and Kandel (1999) note that the hippocampus serves as a conduit or a temporary mid-term storage for long-term memories (p. 110).

Research over the years has established that memory is not localized in one particular brain area but is distributed over different structures of the brain. Lashley (1950) trained rats to navigate through a maze and would then remove a small area of the cortex in each rat. The rats were retested on their maze navigation to see how much of the training was intact in them. Lashley found that rats performed the task irrespective of the lesion. Although the removal of bigger areas disrupted the task, no single area was demonstrated to be uniquely responsible for the memory storage. According to Squire and Kendal (1999): "No single memory region exists, and many parts of the brain participate in the representation of any single event" (p. 10).

The account above has demonstrated that although memory is an abstract cognitive function, it has a physical and anatomical basis and is spread over different areas of the brain. The question that we are going to explore next is: how is memory itself actually organised?

4.2 Long term memory: types and processes

Long term memory (LTM) holds information over a long period of time such as hours, days, weeks, months and years and appears to have an infinite capacity. From a functional perspective, LTM has been divided into two types: (a) declarative memory; and (b) non-declarative memory. 'Declarative' and 'non-declarative' memory are broad terms which refer to contrasting memory systems in terms of the conscious accessibility or verbalization of information. Declarative memory includes semantic and episodic memory and entails 'knowing that' (Nadel and Moscovitch 1998, p. 436) or 'you know that you know' (Gluck et al 2008, p. 85). Information in declarative memory is easily verbalized. Non-declarative memory, on the other hand, includes procedural memory and entails 'knowing how'. Information in non-declarative memory is difficult to verbalize and reflect upon. This division is based on conceptualizations by researchers of different functions that each system performs, drawing on evidence from comparisons of memory functions in normal people with those of brain-damaged patients and findings from studies of neuroimaging of the brain.

Figure 4.2 captures one possible relationship between the different types of memory and subtypes of long-term memory.

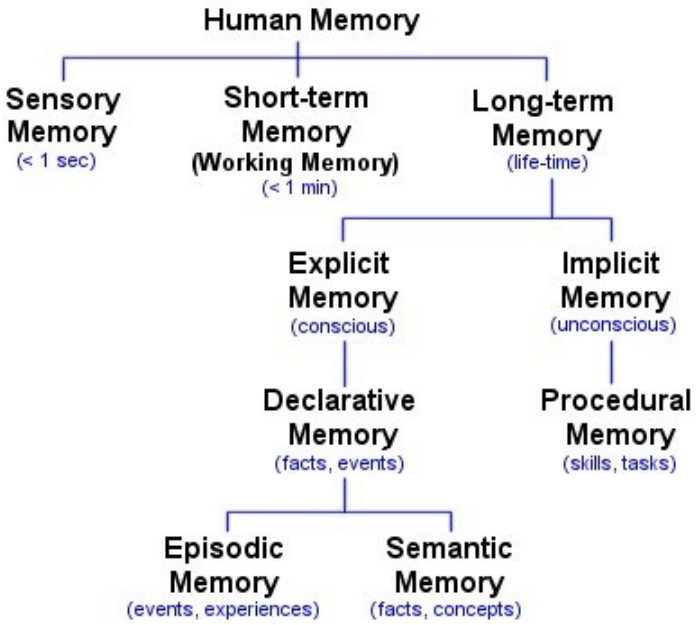


Figure 4.2: A general model of human memory (http://www.human-memory.net/types.html)

In what follows, I will discuss the declarative and non-declarative memory systems and their subtypes in some detail. The focus will be on the representation of information in each memory system with a particular reference to Quran memorization. I will also examine conditions which lead to conservation and availability of information in these memory systems.

4.2.1 Declarative memory

Declarative memories are concerned with factual information, i.e. facts and events, and can be consciously or intentionally recalled (sometimes they just come, though!) with individuals being conscious of their recollection. Tulving (1972, 1983) identified two types of declarative memory, which he viewed as distinctive enough to warrant classifications of their own. Consequently, two components, semantic and episodic memory, are now standardly recognised in memory research. Semantic memory concerns itself with memory for meaning

and general knowledge and is independent of any particular socio-temporal details; 'episodic' memory, on the other hand, refers to memories for past events and experiences and is stored in terms of temporal and spatial details. Semantic and episodic memories are, however, not mutually exclusive systems; rather, they overlap and are interdependent. According to Williams, Conway and Cohen (2008):

> Semantic knowledge is derived from personal experiences by a process of experiences and generalization. Episodic autobiographical memories are interpreted and classified in terms of general semantic knowledge in the form of schemas and scripts (p. 22).

4.2.1.1 Semantic memory

This section looks at semantic memory and establishes the nature and status of information in there with reference to some models of long term memory. We then explore Quran memorization with respect to this and ask whether the Quran text ends up as part of the memorizers' integrated knowledge in long term semantic memory.

Semantic memory according to Tulving (1972) is:

> [a] mental thesaurus, organized knowledge a person possesses about words and other verbal symbols, their meaning and referents, about relations among them, and about rules, formulas, and algorithms [rules for solving problems] for the manipulation of these symbols, concepts, and relations (p. 386).

The above definition describes semantic memory in terms of general/generic knowledge abstracted from past experiences, including the knowledge of language, without any awareness of the spatio-temporal details of events. For example, a person may remember details of an event without remembering where or when he/she had heard them.

Classic models of semantic memory (Collins and Quillian 1969; Rosch and Mervis 1975; Collins and Loftus 1975) have proposed that information in semantic memory is represented in a network of knowledge or concepts. An important issue, however, relates to the schematic versus non-schematic representation of knowledge in semantic memory. Various researchers have debated and differently interpreted the issue. Neisser (1984), for example, argued that instead of storing specific details of an event as suggested by Bahrick (1984), people retain a

schematic representation of knowledge in long term memory. Schemata, according to Alba and Hasher (1983), represent knowledge abstracted from experiences over an extended period of time. According to Neisser, details of an event are reconstructed on the basis of schemata; in other words, specifics are reconstructed from abstracted general knowledge in memory. However, although the details are reconstructed from the abstract representation, the impression one gets is as if they are stored in their own right. On this view, long-term memory is strongly reconstructive.

Taking the above view, it would be reasonable to ask whether the Quran memorizers are reconstructing the Quran text from something more abstract. Do they, in the first instance, make an abstract representation of the Quran from which to reconstruct the text? If they are, then can it be assumed that they have a schema for the structure of the language of the Quran, i.e. Classical Arabic, which they might have developed over a period of time? If so, they would need to have developed some sort of knowledge of the language of the Quran—sufficient to enable reconstruction from more abstract principles. This knowledge would come about from pattern recognition. What they memorize would be part of a system distilled from frequent and numerous exposures to the Quran text, rather than something freestanding and linear, or composed of disjointed bits and pieces. They would be expected to show sensitivity to pattern-recognition in Classical Arabic (see chapter 6). In other words, if asked, Quran memorizers should be able to differentiate between correct and incorrect sentences in Classical Arabic. Chapter 7 investigates this hypothesis.

Conway et al (1991), however, argued against a strongly reconstructive version of the long term knowledge advocated by Neisser (1984). They contrasted memory for conceptual knowledge with memory for specific details over a period of 12 years in the absence of any rehearsal. Three hundred and seventy three students were tested on knowledge of cognitive psychology which they had studied as one year course for their degree. Participants' memory was tested in relation to their knowledge of proper names of researchers, concepts and conceptual relations from the taught course. Memory was tested by recognition and recall, and tests were slightly modified to cover the updated material. According to the results, information registered quick loss over the first few years, after which it reached plateau and was available at an above chance level after 12 years. However, concepts initially showed less rapid decline than names. According to Conway et al, the difference in decline for two types of knowledge over the early intervals lies mainly in the schematic nature of very long

term memory that Neisser (1984) proposed. For example, arbitrary details, such as names do not lend themselves to being represented in a schematic representation and thus show a rapid loss; in contrast, concepts form a systematic structure in a kind of schematic representation and, therefore, show enduring retention. Bahrick (1983) showed that street names do not give themselves to schematic representation and hence suffer from quick loss. Cohen (1990) demonstrated that proper names are difficult to recall, compared to information such as occupation and possessions, because names lack semantic associations and do not get integrated into schematic structure. In sum, retention over the long term is a function of knowledge type with conceptual knowledge showing more durability as opposed to arbitrary items.

Schemata-based evidence for long term memory notwithstanding, some of Conway et al's findings go against the strict version of the theory. For example, although memory for proper names dropped initially, it remained at above chance level throughout the retention period. According to a strong reconstructive view of schema theory as advocated by Neisser, memory for proper names should have dropped to a chance level because names could not be abstracted into a schematic representation. Conversely, against the prediction of the schemata view, memory for conceptual relations was not well retained and demonstrated sharp decrement initially. Conway et al concluded that in their study the initial decline in conceptual relations as opposed to the retention of names and facts over long intervals at above chance level show that "the knowledge structures formed by the students were, primarily, highly specific and detailed rather than abstract and relational" (p. 408). In their view, both the core knowledge and specific facts are retained over the long term.

If Conway et al's view is accepted, then it can be argued that the Quran memorizers' long term recall is possible by means of highly specific, arbitrary and detailed knowledge of the text. However, it is also possible that the memorizers might form some sort of core schematic knowledge of the Quran in long term memory to guide their recall. We will come back to this issue in chapter 5.

4.2.1.2 Episodic memory

Having looked at the structure of the first component of declarative memory i.e., semantic memory, explaining how knowledge is represented and organized there, this section will

explore the second component of declarative memory i.e., episodic memory. Although it may seem that episodic memory is not relevant to Quran memorizers, they undertake their memorization in the same location, using the same book, and in the same learning conditions, for the same purpose, day after day. Is it possible that this provides certain kinds of hook(s) into long term memory that are more episodic in nature? In order to find out, we need to examine what episodic memory is like.

According to Tulving (1972; 1983), episodic memory is a system for remembering personal experiences and events in the context of the spatio-temporal details of where and when they occurred. For example, dinner from last night, a conversation with a friend over a cup of tea, parking the car at a certain place, or remembering an appointment with a doctor all refer to personal experiences or episodes in our life. Information in episodic memory is autobiographically referenced with all the perceptible attributes of where and when the event took place. In other words, episodic memory is chiefly rooted in the input conditions. According to Tulving (1972): "[…] an integral part of the representation of a remembered experience in episodic memory is its reference to the rememberer's knowledge of his personal identity" (p. 389).

Although the episodic and semantic memory systems have specific functions to perform, they are nevertheless interrelated and interact with each other. According to Tulving (1993):

> The relation between episodic and semantic memory is hierarchical: Episodic memory has evolved out of, but many of its operations have remained dependent on, semantic memory. A corollary is that semantic memory can operate (store and retrieve information) independently of episodic memory, but not vice versa. Episodic memory is not necessary for encoding and storing of information into semantic memory, although it may modulate such encoding and storage. Semantic memory develops earlier in childhood than episodic memory. Children are capable of learning facts of the world before they remember their own past experiences (p. 68).

It means that although episodic memory can modulate information into semantic memory, it does not necessarily have to. Whereas semantic memory is generalized knowledge, episodic memory is subtended by the person's conscious awareness and added details of the experienced events. Our general knowledge (semantic memory) of the world is extracted and

abstracted from specific experiences (episodic memory). Over a period of time "episodic" experiences become separated from their spatio-temporal references and are available to us as general knowledge (Baddeley 2010, p. 93). Instead of two competing systems, semantic and episodic memories can be thought of as two complementary systems which together make up our long term declarative memory system. Yet, the contents of episodic memory are more prone to forgetting than those of semantic memory which enjoy a relatively stable and longer life (Tulving 1972). The loss of information from episodic memory is attributed normally to interference from material similarly coded/dated, leading to qualitative changes as a result of retrieval (Tulving 1972, p. 394). That is, memories get confused with each other. This is an important observation that will be returned to in the chapter 5.

According to Tulving (1972), retrieval from episodic memory, unlike semantic memory, is always non-inferential and only that bit of information can be retrieved that has been experienced by the individual. This implies that the Quran memorizers might internalise the event of memorizing the text, that is, when and where (it is always in the mosque) the text was memorized. For example, they might remember a sense of distance of time—the order in which they learned the verses, and how long since they learned them. This would give them a timeline for getting them into order (it makes sense of why they learn the text in order). Their memory of learning the Quran might be 'episodic' in the sense of its being time-sensitive: a memorizer might remember that he learned a particular verse or a section of the Quran before another verse or section, or that he learned it a long time ago. Although the Quran will be memorized in a sequence, every event of memorization will be an episode in itself with its own characteristic episodic details. The whole act of memorization with various details might thus imprint itself on the mind of the memorizer (Port 2007; Taylor 2012). The memorizers might make a personal reference to the event of memorizing the text, standing as a distinct fact in their memory. Moreover, visual and sensory input would serve as back-up for recall in that they might remember where on the page the text occur or what precedes or succeeds a particular verse or phrase.

Picking up on earlier discussion, the research reviewed above further underpins an important issue in relation to Quran memorization. That is, for words to be in semantic long-term memory, one has to have some sort of 'meaning' to encode at the conceptual level. Tulving's definition of semantic memory underscores the importance of the relationship between form and meaning. As form (phonology) cannot be stored in long term memory on its own (i.e. in

the absence of meaning), the Quran memorizers might make use of another kind of meaning i.e. visuo-spatial. Meanwhile, episodic memory is assumed to store information in terms of personal experiences in the context of the spatio-temporal details of the events (Taylor 2012). In the discussion section of this chapter we will look at the match of the Quran memorization to: (a) semantic memory; (b) episodic memory; and (c) procedural memory, and will try to establish which memory store the Quran text most probably ends up in.

4.3 How is information maintained and retained in the long term?

Although sometimes we remember information without necessarily rehearsing it, experience from daily life shows that information needs to be constantly updated or refreshed to be available over the long term[4]. If we do not use or encounter information for a certain length of time, we run the risk of not correctly recalling it or not recalling it at all. It is, therefore, appropriate to explore what the literature says on maintaining information for long term recall and what that might mean for the Quran memorizers. In the account that follows, findings from some seminal works dealing with lifelong maintenance of knowledge will be discussed.

4.3.1 The effect of acquisition conditions on long term retention

Research on the acquisition and retention of knowledge indicates two types of studies: (a) Laboratory studies which measure memory performance up to a few hours only under controlled conditions of acquisition and rehearsal; (b) Naturalistic studies which measure knowledge gained and retained over a long period of time such as several years. As the present study is concerned with retention of text over an extended period of time, I shall therefore only look at naturalistic studies.

Bahrick's (1984) study of the retention of knowledge of the Spanish language, learnt in high school, over a period of fifty years, has provided some useful insights into the duration and

[4] Individuals may remember information such as prayers, a national anthem or lines from Shakespeare that they might have learned years ago without rehearsing or recalling them in many years. However, it is important to note that they might be exposed to such information although they may not rehearse it loudly or even subvocally. So, it is possible that individuals may sometimes recall information at long intervals without rehearsal.

maintenance of knowledge over the long term. Initial learning was gauged in terms of courses attended and grades obtained. Minimal rehearsal was reported during the period of retention. Participants' memory of Spanish was tested by reading comprehension, tests of recall, and recognition of vocabulary and grammar. The results revealed that participants who had attended more courses and achieved high grades retained the knowledge of Spanish more than those who attended fewer courses or who did poorly in terms of grades, after a 50-year interval. One interesting finding from the study was that over the course of fifty years knowledge suffered from exponential loss for an initial three to six years, after which it stabilized and no major loss was observed for almost thirty years. Bahrick concluded that the amount of knowledge which remains accessible for over fifty years despite little or no rehearsal and use has entered into 'permastore'—a term that he used for a very long term memory. According to Bahrick, knowledge that enters the 'permastore' and is resistant to forgetting is a result of a depth of original training or learning: retention is determined by acquisition conditions. In Bahrick's study, however, the amount, and distribution of practice were confounded, that is, those who studied more courses also practised more and over a longer period of time. He, therefore, could not show the influence of these variables separately or their interaction.

In a follow-up study, Bahrick and Phelps (1987) tried to tease apart the impact of the above confounding variables. In a longitudinal study, thirty five individuals were tested after 8 years. They had learned and relearned 50 English-Spanish word pairs under three retraining conditions, i.e., at 30 days, 1 day, and with no interval. In the no interval condition a new relearning session began without any break immediately after the previous session was completed. Total practice was held constant as all participants were trained for the same number of sessions. Recall was tested by asking them to write the equivalent Spanish words for the 50 English words.

According to the results, the inter-session interval had a great effect on the retention after 8 years. Recall was 15%, 8% and 6% for pairs learnt at 30 days, 1 day, and no interval, respectively. According to Bahrick and Phelps, retention of knowledge is dependent on acquisition conditions, with little impact of rehearsal. Words which are better learnt initially and are accessed at longer intervals make the memory trace more durable than words that are quickly learnt and frequently accessed at shorter intervals. Although participants trained at the 30 days interval retained more in the long run as compared to participants trained at

shorter intervals, they took more acquisition sessions. The relationship between longer but more acquisition sessions and long term memory has a neurological aspect to it, regarding the most effective way to lay down memories, given how the cells operate. Repeated activation of brain neurons leads to permanent structural changes in neuronal connections. Recalling memories at longer intervals activates, reactivates and strengthens the already established memory route resulting in consolidating the memory trace in LTM (see section 4.1 on how long term memories are laid down). In another longitudinal study, Bahrick et al (1993) investigated the course of acquisition and retention of foreign language vocabulary of four participants. Each participant learnt 300 words (English-French or English-German pairs) in six training conditions with each condition having 50 words. Either 13 or 26 relearning sessions were administered at intervals of 14, 28, or 56 days. Retention was tested after 1, 2, 3, or 5 years of termination of the training. Results showed that longer inter-session intervals and more sessions led to higher long term retention. These two variables, however, affected the long-term recall independently of each other. Thirteen sessions with a 56-day interval yielded retention comparable to 26 sessions with a 14-day interval. Although the longer inter-session intervals slowed down the acquisition of vocabulary, they yielded superior long term retention. On the other hand, words that were learnt at 14-and 18-day intervals, respectively, showed better recall initially, but poorer long term retention. This means that an optimal way to learn vocabulary is to spread learning sessions at longer intervals rather than shorter intervals.

The discussion until now has engaged with the maintenance of language knowledge over the long term, and two factors were identified that result in long term retention of words in a foreign language: initial level of learning, and learning distributed over longer-spaced intervals. The effect, however, is not limited to language acquisition or vocabulary learning, as studies on conservation of knowledge in other fields have also shown similar results.

Applying laboratory findings to classroom settings, Pashler et al (2007) argued that learning of many different types, such as acquisition of foreign language vocabulary, solving mathematical problems, learning from maps, and defining uncommon words benefits from spacing-effect. According to them, longer learning intervals are more effective in terms of retention than the shorter ones.

Bahrick and Hall (1991) conducted a study on the maintenance of high school algebra and geometry over the life span. One thousand and fifty participants were tested. Memory was tested for: (a) specific facts; (b) general principles; and (c) applying principles to a new situation. Results indicated that when the knowledge of algebra was acquired over a period of several years, using, reusing, and relearning the material, the retention level remained high after 50 years even when no rehearsal was reported during the retention interval. In contrast, those participants who acquired algebra only as one year course showed decrement in memory for the material and performed only at chance level at 50-year retention interval. This, according to Bahrick and Hall, shows benefits of spaced learning, i.e. information learnt over an extended period of time divided into shorter sessions is better retained than information gathered in massed practice. As explained above, there is a neurological aspect to this, regarding the most effective way to lay down memories. Connections between brain neurons get strengthened when information committed to memory is spread over a long period of time resulting in activation and reactivation of cells because of repetition.

If it is the case, as indicated above, that the acquisition condition, i.e. how input is initially acquired, is an important requirement for maintaining knowledge over an extended period of time, then input acquired over longer-spaced intervals over a period of time may result in higher long term recall compared to information acquired in massed practice or over shorter intervals.

4.3.2 The effect of retrieval on long term retention

The account so far has showed that participants trained over longer intervals had a better rate of long term retention as compared to those trained over shorter intervals. It means that someone who can easily recall something over short intervals may learn it less well in the end. This may be related to the recency of presentation and last recall, that is, information may be recalled on the basis of recent encounter as opposed to long term memory. The effect of long intervals at acquisition is, however, only one explanation as far as durability of information is concerned. In this section we will look at another explanation i.e. retrieval.

Linton (1975, cited in Baddeley et al 2010, p. 197) tested herself on events from her life at regular intervals over a period of five years. She demonstrated that the more an item was recalled on different occasions the more were its chances of being remembered and lesser its

vulnerability to forgetting and vice versa. Retention was thus shown to be partly a function of how many times an item had been retrieved on earlier occasions. This means that each time an item is recalled, that becomes the interval to the next recall, not the original time of learning.

Karpicke and Roediger (2008) showed that retrieval is critical to consolidation of information. They studied the learning of 40 foreign vocabulary items (Swahili-English word pairs in which Swahili was the foreign language) across four conditions: (a) repeated study-test trials; (b) once an item was learnt, it was repeatedly presented but not tested anymore; (c) an item was repeatedly tested but was dropped from the study; (d) once an item was learnt, it was dropped from both study and test. When tested a week later, repeated testing had led to a large positive effect (80%) on recall of the word pairs. Repeated presentation of items without being tested, on the other hand, had not resulted in long-term retention after a week.

It suggests that to find something in memory for yourself results in more effective learning than to passively 'study' it. Working hard at recalling information from memory matters in terms of longer term retention: the learner actively processes the information and acts on it as he/she searches for it. Retrieving or producing something in this active fashion compared to passively holding it consolidates the memory trace, by strengthening the neurological pathways. Retrieval also entails attention to and elaboration of information.

The discussion so far underscores that retrieving information intentionally and periodically is an effective and critical strategy in relation to consolidating long- term memories: the more one retrieves and uses the information, the more it is maintained and retained in memory. There is, however, more to the act of retrieval than meets the eye. Periodical retrieval, according to Bjork (1988), is not a neutral event, and rather significantly changes the state of information in human memory compared to computer or tape-recorder memory where the contents remain immutable. Bjork considers retrieval practices as a mnemonic aid where an earlier recall enhances memory on a later occasion. He, however, argues that it is a successful or correct recall of an item on the earlier occasion that leads to its successful recall later. Anderson (2010, p. 197) also observes that it is the correct and complete retrieval of an event each time which is necessary for an accurate recall later compared to an incorrect retrieval based on recollection or reconstruction. However, it is important to note that it's only

experiments, where you know the original that enables you to see the effect. With episodic memories of events, of course, it's hard to tell what has been changed.

Retrieval, however, is believed to be most effective and optimal when spaced at regular but expanding intervals. Retrieval at spaced intervals at successively longer delays leads to optimum rehearsal as compared to massed rehearsal or rehearsal at fixed intervals (Landauer and Bjork 1978). According to Bjork (1988), the best way to access and retrieve information from memory is at a point when the information is on the verge of being lost. Accessing information at expanding intervals, according to him, saves it from disuse and ensures a reliable access to information in long term memory.

From the above account it is clear that the effect of spaced learning is pervasive. It is not only at encoding that the effect is found to impact long term recall but also at retrieval. Information retrieved at spaced intervals enhances the recallability and arrests the rate of forgetting. This implies that the Quran memorizers, for effective recall, have to acquire and retrieve the Quran over intervals spaced over a long time. I will come to this point in the discussion section of this chapter to examine just what the Quran memorizers might be doing, in terms of repetition and recall, to guarantee long term recall.

In chapter 2, it was argued that in everyday life meaning is retained better than form because that is what we want to remember. But when the demand changes (e.g. memorizing script by actors or memorizing poetry), forms is also remembered for a longer period of time. In other words, the purpose of learning or memorizing plays an important role in determining retention as well as retrieval/recall of information from memory. In the following section I will discuss evidence how the processing of information at different 'levels' might contribute to long term recall.

4.4 Levels of processing

The focus so far has been on how acquisition conditions of input, such as initial depth of learning the material, spaced learning, and retrieval of information at spaced intervals lead to strong memory traces. Research, however, has shown that long term retention depends on how people process input, that is, what they do with it at the time of encoding. According to Eysenck (1982, p. 203), "Memory performance is determined far more by the nature of

processing activities engaged in by the learner than it is by the intention to learn per se". In a seminal work, Craik and Lockhart (1972) proposed a theory according to which recall is a function of the nature and level/depth of cognitive processing of information at encoding. They argue that the depth of processing lies on a continuum from deep or elaborate processing (i.e. semantic coding) to shallow processing (rehearsing of information at phonological or orthographic levels). According to them, there are two kinds of rehearsal: (a) maintenance rehearsal; and (b) elaborative rehearsal. Whereas maintenance rehearsal is largely concerned with processing and maintaining information at a current level, such as saying a word to oneself over and over again, elaborative rehearsal meaningfully encodes information in long-term storage. These two types of rehearsal lead to two types of representation: while maintenance rehearsal leads to superficial representation without any recourse to meaning, the elaborative rehearsal establishes relationship between the material being rehearsed and the already existing meaning system. Information stored at a superficial level by means of maintenance rehearsal, therefore, is subject to rapid loss, whereas material encoded at a deeper semantic level will be available over the long term. This illustrates why information has to be constantly rehearsed to be maintained in STM and phonological memory: STM holds information at a superficial level i.e. surface features without any cognitive/semantic hook. So if rehearsal is interrupted or attention diverted, information will slip out of memory (see chapter 3).

In a series of experiments, Craik and Tulving (1975) presented their participants with visual stimuli to make three kinds of judgements: (a) shallow processing at visual level, that is, participants were asked about a word being in upper or lower case; (b) shallow processing at phonological level, that is, participants were asked whether one word rhymed with another word; (c) deep semantic processing, that is, participants were asked whether a word fitted in a sentence. Participants were then shown a list of words, half of which had not been used in the experiment. Their job was to identify which words had appeared in the experiment and which had not. The results showed a marked superiority for semantic processing over non-semantic processing. According to Craik and Tulving, semantic encoding offers a richer and more elaborate code, facilitating long-term retrieval, compared with phonological or orthographic processing, which lasts for a short time only.

Yet, as we have seen, Quran memorizers seem only to have phonological and orthographical information, and are still remembering the Quran over a long period. This leads us to ask

some questions: What is the relationship between depth of processing and frequency of recall? Does the latter compensate for the former? Or is the Quran not truly memorized—if it were neglected for years, would it be recalled? I will get back to these questions in the discussion part of this chapter.

Although the levels of processing provide a rule of thumb, Baddeley (1978) points out that the model suffers from circularity in defining depth in relation to recall as there is no independent way of measuring the depth of processing except by recall.

Another issue with the 'levels of processing' model is that it limits depth to meaning only, i.e. to remember information over the long term, one needs to hook it in the meaning. There can be no long term retention in the absence of semantic encoding and elaboration. But is it knowing the meaning of text alone that makes a task meaningful and thus fit for deeper processing and better recall? Could non-semantic (visual or phonological) stimuli, in the absence of elaborative rehearsal, be processed at a deeper and more meaningful level? These are important questions because we know that non-Arabic speaking Quran memorizers do not know the language in which they memorize but they recall the text over the long term. It means that they may be relying on phonological and visual information for long term retention. Hence, there is a possibility that they may process non-semantic information at a deeper level, not envisioned by the levels of processing theory. Hulstjin (2001) has made the point well:

> The more a learner pays attention to a word's morphonological, orthographic, prosodic, semantic and pragmatic features and to intraword and interword relations, the more likely is it that the new lexical information will be retained. It is not important whether the learner does so with the explicit intention to commit the information to memory and not to forget it *(intentional learning)* or with the intention to use the information for the successful completion of a listening, reading, speaking or writing activity (potentially resulting in *incidental learning)* (p. 279).

On Hulstjin's account, good memory accrues from an analysis of a number of features of the to-be-remembered information. Cognitive analysis of multiple features such as phonemic, orthographic, syntactic or semantic will result in extensive processing and will lay the foundation of a richer, distinctive and durable memory trace. This is in accord with Lachs et al

(2000) view according to which "all experience with speech is encoded and preserved in a detail-rich, complex and multidimensional representation" (p. 164). Taylor (2012), and Port (2007, 2010) suggest that the mental lexicon is episodic in nature and stores speech events in all their details. According to Port (2007): "Words are stored in a very concrete, detailed auditory code that includes nonlinguistic information including speaker's voice properties and other details" (p. 143).

The original conceptualization of depth notwithstanding, Lockhart et al (1976) have argued that depth is a result of cognitive analysis within a particular domain. Cognitive analysis directed at any particular domain e.g. phonological, semantic, etc. will result in better memory for information in that domain only. According to this account meaning may not be critical for long term memory, if the aim is not to retain meaning—which in the Quran context it is not. The objective behind learning is crucial in remembering whatever details learners want to remember over the long term: if the objective is to keep the form in the long term then the learner will focus on and manipulate different perceptual features at a required level to achieve the objective. Phonological and orthographic details, thus, may be well retained over the long term provided that is all a learner wants to learn. McDaniel (1981) provided support for this line of argument. He investigated the effect of syntactic complexity or difficulty on memory for text by varying the syntactic form of sentences. Participants were presented with sentences in one of the three forms: (a) self-embedded-reduced, with relative pronouns deleted e.g. "The car the man the dog bit drove crashed"; (b) self-embedded-unreduced, with relative pronouns included e. g. "The car that the man whom the dog bit drove crashed"; (c) and regular e.g. "The car driven by the man that the dog bit crashed". His results showed that sentences that were difficult to process (unusual construction) were better remembered for the form than for the meaning. According to McDaniel, regular sentences required fewer encoding operations than the complex ones and thus little information was available to retrieve the form as compared to the complex sentences which required additional processing and thus had richer memory traces.

McDaniel's interpretation notwithstanding, some alternative explanations are also possible. For example, participants in McDaniel's experiment were well able to notice the pattern and reconstruct it from scratch. Or as Wray (2008) argues (although she talks about deliberate memorization, not incidental remembering) simple constructions are quickly discarded as easy to understand and also to reconstruct, whereas difficult ones are held onto for longer,

because the learner doesn't trust him/herself. It follows that memory can be a by-product of processing, but one can also control memory by increasing one's attention to the stimuli. One will do that most when it matters to get the recall absolutely perfect, as with the Quran memorizers.

The effect of deeper processing on long term memory, however, has been differently interpreted by different researchers. Morris et al (1977), for example, proposed a theory called 'transfer appropriate processing' (TAP), according to which best retention and retrieval of information results when the modes of encoding and retrieval are the same, or when features encoded and processes involved at encoding and retrieval overlap. In other words, TAP means that information retrieval will be best when the encoding task and retrieval type are the same. Morris et al (1977) illustrated this point in an experiment which involved (a) semantic (i.e. deep) processing, such as "Does the word that follows fit the blank in the sentence? "The—had a silver engine", train"; (b) shallow processing, such as a judgement of rhyme, "Does the word rhyme with rain? Memory was tested by a standard recognition test and a rhyme recognition test. The results showed that while semantic acquisition was better in the standard recognition task, rhyme acquisition was better in rhyme recognition task. A related idea, the 'encoding specificity principle' (ESP) was proposed by Tulving and Thompson (1973) which posits that our memory of stimuli depends on the similarities of processes at encoding and retrieval. According to them: "In its broadest form the principle asserts that only that can be retrieved that has been stored, and that how it can be retrieved depends on how it was stored" (p. 359).

The above discussion has revealed a very important point in relation to the durability and retrieval of memory. That is, it is not the difference of degree to which a stimulus is processed at the time of encoding that determines the retention of information but rather differences in processing of particular aspects of stimulus and the similarities between features and processes at encoding and retrieval that determines the long term durability. It may be a potential explanation of the Quran memorizers' durable memory of the text without knowing the meaning. In other words, their recall of the text will benefit from exclusively engaging with processing visual and orthographic form. Moreover, they will show good memory for form if form alone is the target of recall.

4.5 Procedural memory

So far I have engaged with declarative long term memory and the discussion dwelt on the nature and composition of semantic and episodic memory systems in relation to how the Quran text might be processed for long term recall. In this section I will investigate another kind of long term memory i.e., non-declarative memory. I will explore if the Quran memorizers, in some way, might draw on procedural/skilled memory in committing and remembering the Quran to memory.

'Procedural memory' is a term used to refer to how people perform different actions such as riding a bicycle, typing on a computer keyboard, playing a musical instrument, playing a game, and speaking their mother tongue. All these are skilled activities the performance of which lies outside conscious recollection. Can it be the case that the more the Quran memorizers practise, and the more they become skilled at reciting the text, the more proceduralized their knowledge becomes?

Procedural memory accommodates a number of subsystems, like motor learning, simple conditioning, and associative learning. What distinguishes procedural memory from semantic memory, on the one hand, and episodic memory, on the other, is not only the nature of acquisition, representation, and expression of knowledge but also the conscious awareness of the knowledge by the individual. According to Schacter and Tulving (1994), the procedural memory system is different from other memory systems in term of final output. They argue:

> The […] other major systems are concerned with cognition. That is, the final productions of all these systems can be, and frequently are, contemplated by the individual introspectively, in conscious awareness. Any conversion of such a product of memory into overt behaviour, even symbolic behaviour such as speech or writing, represents an optional postretrieval phenomenon, characterized by considerable flexibility regarding the behavioural expression. Such an expression is absent in the procedural form of memory (p. 27).

Procedural memory is performance-based and efficiency at any given task is gradually enhanced through repeated trials. The repeated attempts at executing a task lead to habit learning and automatization in that the learner is not aware of what they are doing and how it was learnt in the first place (Lee 2004, p. 44). Thus the more a skill becomes automated, the

less it entails conscious cognitive load, i.e. people take less time and/or effort to perform the task. The fact that procedural memory is also called nondeclarative refers to people's unconscious mastery of a task without the need to articulate or verbalize it (Squire 1994). According to Squire and Kandel (1999, p. 24), "non-declarative memory typically involves knowledge that is reflexive rather than reflective in nature". Although procedural memories become nonconscious and automatic with practice, they start as declarative knowledge. So, as a skill develops over time it takes a path from conscious declarative knowledge to unconscious proceduralized knowledge (Ullman 2004).

Nearly half a century ago, Fitts (1964; Fitts & Posner 1967) proposed a powerful account of skill acquisition. According to him, skills are acquired in three phases: cognitive, associative, and autonomous. The cognitive phase involves deliberate cognitive processes and lasts for a few days. In the associative phase performance strategies are refined. This phase may last for days or months. In the autonomous stage performance is less subject to cognitive control and concurrent outside interference. As a result the less the cognitive involvement, the less processing required. This last phase is marked by efficiency and speed, and the performance is less vulnerable to errors.

Based on Fitts' work, Anderson (1983) proposed a model of acquisition of cognitive skills. He describes three phases of skill acquisition (corresponding with Fitts' three phases), that is, declarative (characterized by using general-purpose problem solving strategies), knowledge compilation, and procedural. According to Anderson, knowledge conversion from declarative to procedural stage happens during knowledge compilation. VanLehn (1996) also described three stages of cognitive skill acquisition: early, intermediate, and late. Although these models of skill learning may vary in specific details, there is an agreement on the three stages of learning. Proctor and Dutta's (1995) definition of skill captures the essence of core characteristic of a skill as envisioned in different models of skill acquisition: "Skill is goal-directed, well-organized behaviour that is acquired through practice and performed with economy of effort (p. 18).

A question pertinent to the present study is: can one have skilled memory for text recitation? In other words, can one develop memory for text similar to a person's skill in driving a car? This entails that an individual, over repeated trials/attempts at memorizing a text, would

gradually learn connections between different parts of text to achieve a coordinated performance/recital in a manner similar to that of a driver's learning how to drive a car.

A lot of procedural memory is about motor skills or neuromuscular memory. Muscles of the body can be so trained that they move in a coordinated way: repeated practice results in reinforcement and automatization of the muscle memory. Given that the Quran memorizers practise and rehearse the text regularly, is it possible that part of their recall capacity is a result of repetitive movement of body muscles, the vocal articulators?

It can be argued that Quran memorization might be a skill in the sense that the text has been rehearsed so often that it is available as proceduralized knowledge. The memorizers may start memorization as a conscious process but the more they repeat the less conscious they are of what they are doing, resulting in the automatization of recall.

4.6 Mnemonics and retention of information over long periods

So far I have examined the various parameters for keeping information over long term. I will now look at the role of another factor, mnemonics, in processing and storing information for long term retention. To explain the Quran memorizers' efficient memory of the Quran text, I will briefly outline the concept of mnemonics and will then survey two important and widely used mnemonic techniques to see if they shed any light on what the Quran memorizers might be doing to remember the text.

Mnemonics are intermediaries to help remember information. They offer elaborate mechanisms for processing material in that they provide a cognitive foothold in both the short and long term. Mnemonic techniques are commonly divided into two groups: verbal (word-based) and visual (image-based). Some mnemonics, however, use a combination of both verbal and visual forms for long-term recall. Research (e.g. Baddeley 2010; Bellezza 1996; Higbee 2007) highlights reasons for the effectiveness of mnemonic aids in the retention of information: (a) Mnemonics make the to-be-remembered information more memorable than the original by organizing it in meaningful ways; (b) They help organize information in chunks; (c) Some mnemonic devices involve visualization or imagery which enhances the memory trace by providing a link to or an association with verbal information; (d) Mnemonic

devices involve paying attention to the material as learners deliberately create the link and this itself helps encode information in the long term; (e) Mnemonic devices help connect/associate and integrate the to-be-remembered information into pre-existing knowledge by the process of elaboration, resulting in successful encoding and retrieval.

4.6.1 Keyword method

The Keyword method involves associating a target foreign language word by means of visual and acoustic links to a keyword that one can more easily remember (Atkinson 1975; Gruneberg 1987). Although the keyword would normally to be in one's native language, it doesn't have to be. A learner can choose whatever word and from whatever language he/she thinks might work best for him/her.

To remember an item or a piece of information, a 'key' word is chosen which is in some way acoustically similar to the to-be-learnt word. The key word's meaning is then associated with the meaning of the to-be-remembered word in an interactive visual image. For example, for an English speaking learner of Spanish, the word *vaca* meaning cow could involve learning it in two stages: in the first stage the learner needs to speak out the foreign word to make an acoustic association between the foreign word *vaca* and the keyword *vacuum* on the basis of acoustic similarity; in the second stage, the learner is required to make an interactive mental image that combines the meanings 'vacuum' and 'cow'—for example, a cow holding a vacuum cleaner, cleaning a field (Gruneberg 1987). Recall of a foreign word and its meaning is arrived at indirectly through non-semantic means, that is, the relationship between sound and image. The learner, however, needs to have the semantics of connecting the image of a vacuum cleaner to 'vacuum' and also to an image of a cow, and hence to the meaning 'cow'.

Atkinson and Raugh (1975) reported a study in which they tested foreign language vocabulary acquisition in native speakers of English in two conditions: (a) an experimental condition using the keyword method; (b) control condition using their own strategies. In the experimental condition, for example, participants were given a Russian word (linkor) and its English translation (battleship). They were also given an English keyword (Lincoln) sounding like the Russian word and were asked to use it to remember the Russian word. According to Atkinson and Raugh, participants using the keyword method learned more words than did the control group. Moreover, the learners under the keyword method had this advantage up to six

weeks later. According to Cohen and Aphek (1998), learners using associative methods such as the keyword method show better vocabulary learning than ones not using the keyword method or the ones using rote-learning. Ellis and Beaton (1993) claim that combining the keyword method with verbal repetition results in optimal performance (p. 608).

Although the keyword method has been very effective and influential in foreign language vocabulary acquisition, a significant weakness of Gruneberg's method is that he prescribes and tells the learner which L1 word to use and what to imagine. As discussed in the beginning of this section, one of the reasons behind effectiveness of mnemonics is that they provide a link to or an association with information. However, a mnemonic method can be optimally beneficial when the mnemonic is not given, but has to be thought up by the learner himself because deliberately creating a personal link entails more effort as opposed to a ready-made link provided by someone else.

The mnemonic technique underpinning the keyword method is an interactive image between the keyword and the to-be-remembered piece of information. The aim is to make a form-meaning association and the keyword creates a temporary link between them, to enable the form to come to mind when the meaning is retrieved. Given that the Quran memorizers memorize in a foreign language, is it possible that they might be using keywords in their L1 to create an interactive image for the to-be-remembered verse or phrase? Or is it possible that the keyword is used as a cue for remembering and recalling a large and long piece of text? The keyword might just be used as a cue or a prompt to trigger the first sound of a segment of text, facilitating recall of a longer portion or stretch of memorized material.

4.6.2 The method of loci

The method of loci is a mnemonic device in which the to-be-remembered information is associated with and tied to physical locations, either imaginary or in the real world. According to Neath (1998), three steps are involved in this system: (a) a series of familiar locations along a structured route for remembering the information in a given order; (b) an interactive mental image of the to-be-remembered material in a particular location along the route; (c) mental walking between different locations to recall and reconstruct imagery and memory (p. 386). There is thus an elaborate system making use of memorized spatial locations to organize and recall ordered information through visualization. While encoding

information to memory, all a learner has to do is to make a mental image of the to-be-remembered information and mentally put it in the first location on the way, the second piece of information in the second location, and so on. It is important to associate one item with one place, else there is danger of confusion. Retrieving the information involves mentally retracing one's steps through the same locations and recalling the information at every stop in a given order. However, this doesn't of itself bridge form and meaning. It's more for the sequence, once you have mastered the form.

De Beni et al (1997) showed the effectiveness of the method of loci in remembering a long text over the long-term. They tested senior high school students. Participants were divided into two groups on the basis of their memorization strategy. While participants in one group were trained in using the method of loci, in another group participants were engaged in rehearsal or verbal repetition. A 2000-word text (comprising different text types, such as expository, descriptive, and narrative) was presented either orally or in written form and participants were asked to memorize it using either the method of loci or rote rehearsal. To eliminate the recency effect, participants, after the presentation, were engaged in a short interpolated task for one minute (i.e., counting backwards from a three digit number) which was followed by writing down the main points of the text in the order of the presentation. After a week, the participants were called back for an unexpected free recall.

According to De Beni et al's results, participants using the method of loci performed better than the rehearsal group at both short (one minute) and long (one week) intervals. There was also a strong oral presentation effect, that is, participants using the method of loci performed better under oral presentation than under written presentation. This, according to De Beni et al, is due to the selective interference between reading and visuo-spatial imagery because both processes use the same cognitive resources. In contrast, the group using rote-rehearsal performed better under the written presentation, because there was no interference between verbal repetition and reading the written text. De Beni et al reason that the method of loci is effective for "the orderly memorization of information" (p. 413).

Would it be possible for a Quran memorizer to use a mnemonic method such as 'loci'? What would the memorizer need to do to achieve it, and how might we know? What would it look like if a Quran memorizer was using several modes together to memorize? And if that's what Quran memorizers do, how do blind ones manage?

The method of loci offers a model for the proposal made in section 4.2.1.2 (see above) that Quran memorizers might use locational cues to remember the text. Different but familiar locations in the mosque or different locations along the route may provide key points to mentally associate words or portions of the text with. On mentally retracing his steps, a memorizer might retrieve the text in a given order using a key word or phrase as a prompt. The more he mentally walks through the intended and well-defined path, the more the text sticks in his memory. This may not apply to blind memorizers however, because of the obvious fact that they can't see. The possibility, however, exists that the blind memorizers might 'imagine' or 'visualize' locations to tie the text to, and to take a mental walk along the 'route' they have imagined for themselves to retrieve the text.

In sum, all the Quran memorizers have to do is to make a vivid and detailed image of the scene in their mind, to connect sound to the image. They might bypass the linguistic meaning in the process**.**

4.7 Discussion

In this chapter we focused on the nature, organization and retention of knowledge in LTM. The literature reviewed above has indicated the following key findings.

- Information is differently represented in the episodic and semantic memory systems
- Linguistic meaning may not be critical for long term memory
- Some circumstances may warrant long term retention of surface features
- Spaced learning is an essential requirement for long term retention
- Mnemonics may play an important role in storing information over the long term
- Practice and rehearsal may result in skilled or procedural memory

These findings answer the two questions posed at the start of this chapter:

(1) How does information get into long term memory?

It was noted that repetition and rehearsal are not only a means of keeping information 'at hand' over the short term, but are also a way of transferring information into long term

memory: the more a person repeats the information, the greater are the chances of its getting into LTM. There was a neurological explanation for it: repeated activation of brain cells results in permanent structural changes in the brain. Recalling information strengthens the neural representation leading to consolidation of memory traces. However, the literature also indicated that the long-term retention of information is dependent on how information is processed.

(2) What are the main parameters for successful and less successful lodging of information in long term memory?

According to the literature, successful lodging of information in long term memory is dependent on various factors. Meaning was shown to be the most important pre-requisite for long term retention. However, it was highlighted that meaning was to be broadly defined to include non-linguistic cues, such as mnemonic or non-semantic hooks. Moreover, it was indicated that acquisition conditions of input (i.e. initial depth of learning information, spaced learning), spaced retrieval of information and depth of processing are necessary parameters for laying down strong memory traces.

So, where does it all leave us in understanding how Quran memorization works? In what follows I will be focussing on answering the following two questions:

(a) According to current research knowledge, what would Quran memorizers have to be doing, in order to integrate the Quran text in long term memory?

(b) Or, if it is not feasible that the Quran memorizers are able to do this, is it possible that the Quran is in fact not stored in long term memory?

Different models of semantic memory show that knowledge in semantic memory is organized in conceptual terms, that is, LTM requires semantically-based storage. Given that the Quran memorizers have no access to the meaning of the text then it is reasonable to explore other possibilities which might facilitate the long term retention of the Quran text. Tulving's (1972) definition of semantic memory underscores the importance of the relationship between form and meaning. For words to be in semantic memory one has to have the knowledge of the

meaning of words at the conceptual level, and the relationship and associations of the words to each other i.e. syntactic or grammatical knowledge. According to Tulving's view, 'words' empty of meanings would not be integrated in the mental lexicon. Also, information in semantic memory is part of integrated knowledge and does not need to be often rehearsed. However, Tulving's implicit definition of meaning is restricted to linguistic meaning and perhaps that is simply too narrow. That is, under different conditions meaning may include different things. The concept of form paired up with linguistic meaning may not be warranted under all conditions. Quran memorizers, for example, may pair up form with other kinds of 'meaning' such as location i.e. where it appears on the page, or what precedes it by or where and when it was learnt.

We saw from the discussion on levels of processing that there is certainly a possibility of remembering text over the long term in the absence of linguistic meaning. Processing of text at phonological and orthographic levels might result in long lasting memory for the sound and visual features. Although the model of the levels of processing originally interpreted long term memory in terms of meaningful coding and integration of information into the already existing semantic structure, variations of the model and different interpretations of it have certainly indicated that under certain circumstances meaning in the narrow sense may not be paramount for long term recall.

An obvious corollary of this line of argument is that one has to define the purpose of long term retention. If the target is to remember meaning, as is the case in most everyday settings, then all the cognitive efforts will be directed at remembering the meaning, and information will be semantically processed and elaborated. In contrast, if the objective is to remember the form, then all the cognitive efforts will be focussed on processing the surface features. This is in line with the theory of 'transfer- appropriate processing' (TAP) and the 'encoding specificity principle' (ESP) which entail that one remembers what one has stored, and retrieval is best when acquisition and test modes match.

Furthermore, in order to ensure a strong memory trace, it might be possible to encode text at various levels such as phonemic, graphemic/orthographic, syntactic, and semantic to make multiple representations at the same time. The advantage of having simultaneous multiple representations is that several routes are available to the learner to access the information: if one route fails, another is still available to retrieve it. The same rationale is behind the dual

coding theory (Paivio 1986, 1991) which posits that dual coding is superior to single-coding as far as remembering information is concerned (see chapter 3).

We have seen that in theory the Quran could get into semantic LTM, but how could we ascertain whether it really has? What would it look like? Is there a way to distinguish between text stored in, and drawn from, semantic LTM and text that is not? One way might be in relation to claims made about how LTM memories become consolidated and grow over time. Bolander (1989) reasons that "when the number of prefabs stored in memory is large enough, syntactic rules are derived as help for the memory to economize and rationalize processing" (p. 85). This means that in order to decrease the burden on the memory system, language data are restructured and reorganized according to grammatical rules for efficient processing. It implies that the language system including grammatical rules, could emerge as a natural by-product of memorization. The consequences of this claim are enormous for the present study. If the Quran memorizers have such a large text in their long term memory, it might be possible for them to derive rules from the stored text to streamline their memory. This puts us in a position to hypothesize that the Quran memorizers would have developed an insight into/awareness of pattern recognition of Classical Arabic. We will return to this matter in chapters 6 and 7.

If, on the other hand, the Quran memorizers fail to show any such 'knowledge', it would suggest that the text has not been integrated and reorganized along 'grammatical' lines in semantic long term memory and rather stays in some other part of memory. So where could it stay? Given the current literature on human memory, the alternative candidate for Quran storage would be STM. However, we have already noted that STM cannot hold the Quran because it is limited both in duration and capacity.

In the light of research findings on the nature and functions of long term memory (this chapter) and short term memory (previous chapter), it is suggested that the Quran text might end up in episodic long term memory. It was noted that episodic LTM contains information in multiple codes and depends on rehearsal for maintenance and retention, but unlike STM it requires less frequent and less regular rehearsal. That is, we don't need to *constantly* rehearse information as with STM, but we also won't remember it forever—usually because we don't need to. We seem to have somewhere to store such information that will tide us over between recalls. Information in episodic LTM seems to be available for comparatively long intervals

without becoming part of semantic long term memory because the conditions for semantic LTM are never met. As long as we access such information intermittently, we can remember it over the long term.

STM and LTM are two discrete memory stores with qualitative differences in that information needs to be reformulated and reorganized to stay in LTM. As far as episodic and semantic LTM are concerned, information is assumed to lie on a continuum i.e., from episodic to semantic memory. Instead of making a discrete store with qualitatively different material, episodic LTM makes a stage in formation of general long term memories. Information in episodic LTM is half way down on the road to semantic long term memory.

In this way, episodic LTM may act as a bridge between STM and permanent memories. For example, we remember personal identity numbers (PINs), hotel room numbers, names of acquaintances, shopping lists etc. over days and sometimes even longer. Because we tend to forget such information over a period of days or weeks, it implies that either information has not been *sufficiently* rehearsed to consolidate to become part of long term memory or the semantic or mnemonic link to anchor it in LTM is weak or missing.

Perhaps Quran memorization is like an octopus. An octopus is a sea creature with eight tentacles or arms, used for grasping or feeding. In order to be able to recall the text, one uses several tentacles to hold onto it. Meaning, we know, is the strongest of all tentacles. But if the meaning tentacle is not there, the others need to be stronger and sturdier to ensure successful recall. The Quran memorizers might be using different tentacles, such as semantics (if they happen to know the meaning of the text), episodic memory (i.e. location and time of learning, people they were with, etc.), short term memory (i.e. repetition), sensory memory (sound, auditory, visuals, etc.) and associative memory (such as mnemonics, images, etc.) for encoding and retaining the text in memory. The memorizers' successful retention and retrieval of the Quran text over time might thus be a result of these multiple means of grasping or holding on to the text. Different tentacles/hooks may be used to different degrees though.

This idea is consistent with models of learning based on frequency of exposure. Information in episodic LTM is in form of detailed episodes in multiple modalities (i.e. visuo-spatial, temporal, and phonological details). Unlike semantic LTM which is abstract and conceptual

in nature, episodic LTM has been argued to store only minimally abstracted examples rich in details. This is what Taylor (2012) and Port (2007) say about the detailed nature of the mental lexicon. If their view is accepted, the notion of a discrete, reorganised LTM gets muddied.

Episodic LTM offers a plausible explanation for the Quran memorizers' long term recall. The Quran memorizers manage to pack a huge amount of phonological material into memory which is hooked there using a range of associations that constitute 'meaning' in a broader sense than just linguistic meaning. The memorizers can recall it with 100% reliability over the long term. Successful and reliable retrieval of the text may be due to constant and regular rehearsal to strengthen the memory traces in episodic LTM—regular rehearsal results in lowering the activation threshold, making the text easily available and accessible. If so, couldn't the memorizers go beyond the phonetic code to transfer the text from episodic LTM to semantic LTM so that they can dispense with the constant rehearsal? This is a question that we shall return to in the final chapter.

Finally, the research also suggests an alternative explanation to episodic memory: storage in procedural memory might make an extended text available to the learner as skilled knowledge. Such knowledge is performance based and lies outside the conscious awareness of the learner. It is possible that as a result of the memorizer's constant practice and rehearsal the Quran text is stored as proceduralized knowledge and they recall it automatically. However, if the knowledge is procedural, then, arguably, it falls outside the domain of linguistic investigation. For this reason, I will focus on linguistically-relevant options, but without excluding the procedural explanation (see the three alternative explanations below).

In sum, we arrive at three competing explanations for Quran memorization:

1. It is stored in the mental lexicon.
2. It is stored in an episodic LTM with hooks other than standard meaning
3. It is stored in procedural LTM as an automatic skill

As we have seen, explanation 1 requires some kind of 'semantic' aspect to memory and, as Quran memorizers do not understand the text, we have had to broaden the definition of 'semantic' to include other 'hooks' that are meaningful to the learner—essentially, mnemonic devices. However, such mnenomics may have to do with experiences in learning the text, which would make them episodic (explanation 2). Alternatively, the 'meaning' aspect may be incidental to the main process of learning—a temporary device that is discarded once

procedural fluency has been achieved (explanation 3)—much as a learner driver needs to remember ‘mirror, signal, manoeuvre’ but only until the process has been ingrained and automatic.

All three of these possible explanations for storage could entail a developing sensitivity to the shape of Classical Arabic, but make different predictions about how and why it would manifest:

Explanation 1: Mental lexicon

The mental lexicon collects individual items, but organises them into patterns and networks, including semantic sets. Most grammatical theories accommodate the ability to separate off recurrent morphological material so that the root form can be used more flexibly. The morphological material itself is stored with a function/meaning, and rules for how it attaches to roots.

Prediction: Quran learning would entail looking for opportunities to identify such patterns, so as to reduce the load on memory.

Explanation 2: Episodic Long Term Memory

Individual exposures to linguistic material build into memory traces that create frequency-based knowledge of what is likely to occur in the future. Typically in learning a foreign language, there is incidental exposure to many inaccurate forms, as produced by the learner and others in a class. However, Quran learners have only minimal exposure to inaccurate forms.

Prediction: Quran learners would have extremely accurate memory traces of the patterns into which the language falls, and therefore should be very much able to identify anomalous patterns that they have never previously encountered.

Explanation 3: Procedural memory

Memorization is a matter of motor training, through repetition. It will entail extreme sensitivity to rhythm and sequences. Much as in a memorized dance, the 'correct' moves will be familiar, while 'incorrect' moves feel anomalous.

Prediction: When a Quran learner reads aloud a sentence in Classical Arabic that involves a sound-sequence never produced before (that is, one that begins in a familiar way but continues in an unfamiliar way) he should be able to notice it.

Jointly, it is possible to make the following predictions[5] as presented in Table 4.1:

	Able to say that a pattern is incorrect	Able to say what it should have been	Able to offer some explanation
Explanation 1: Mental lexicon	✓	✓	✓
Explanation 2: Episodic LTM	✓	✓	x
Explanation 3: Procedural memory	✓ (only when reading it aloud)	x	x

Table 4.1. **Three different predictions about Quran memorizers' sensitivity to the patterns of Classical Arabic**

In sum, the literature has suggested that if one just repeats and recalls information at the phonological and orthographic level, then it is shallow processing, and it doesn't last. Yet with Quran memorizers it does last. Why? A potential answer to this question could relate to the Quran memorizers' constant repetition practices. However, they neither repeat constantly (STM) nor never (semantic LTM), yet they repeat sufficiently to be comparable with what would, for other kinds of learning, lead to the laying down of permanent LTM traces. Is it the

[5] It should be noted that these three models are not as exclusive as they first seem. As noted in this chapter, researchers such as Port (2007) and Taylor (2012) propose that the mental lexicon (explanation 1) is actually the repository of traces from built up episodic memory (explanation 2). Meanwhile, procedural memory (explanation 3) can be recognised as inherent to the production of material from the mental lexicon and developed on the basis of individual episodes of practice. Nevertheless, this simple three-way division is enough to point the way to predictions that can be taken forward in the empirical work in this study.

absence of meaning that prevents the permanent laying down? It has been suggested above that ‘meaning’ might include other hooks that the Quran memorizers may indeed be using.

This chapter suggests that memorization needs to be conceptualized as a set of requirements that can be in different balances. While typical memorization entails both deep processing and regular (albeit not too frequent) repetition, one can get the same effect through not doing one and doing more of the other. In other words, if one doesn’t have the deep processing, one can compensate by changing the regularity of the repetition, to what would be, with deep processing, non-optimal. If so, then we would be able to see differences in the memorization practices of Quran memorizers who do and don’t know modern Arabic (see chapter 5). Although modern Arabic is not identical to Classical Arabic, it is certainly closer to it than languages like Pashto, Urdu and English which we might expect to offer learning advantages that reduce the memorization burden (see chapter 7).

Chapter 5

Interview data- methodology and data analysis

5 Introduction

So far I have looked at research to know about different memory systems in terms of their working, that is, what happens to information in each memory system. I've also looked at previous research so as to infer, from other contexts, what the Quran memorizers are likely to be doing. Now, however, it is necessary to approach the question from the other end, and consider what the Quran memorizers and teachers believe they are doing. It will then be possible to compare the two sets of findings, to understand what the particular parameters are that make Quran memorization successful.

To investigate how the non-Arabic speakers memorize the Quran, there is a need to examine not only the practices and experiences of the Quran memorizers but also their perceptions and perspectives on memorization of the Quran.

This chapter is divided into two parts. Section 5.1introduces and discusses the research tools in relation to collecting data from the Quran memorizers and the method of recording and transcribing the data. Section 5.2 deals with analysis of the interview data.

5.1 Methodology

5.1.1 Choosing a data collection tool

Several options were considered in order to explore how the memorizers might memorize the Quran. For example, one option was to observe classes in which the Quran was memorized. The issue with observation as a methodology, however, is that although observing classes gives us insight into what the learners actually do or how they behave while learning, it does not give us information about why they do these things. Thus while observing the Quran memorizers might tell us what memorizers do at a particular moment in the classroom, it does

not take us deeper into what the memorizers think they do. Although I did observe the students memorizing the Quran, this study is mainly focussed on cognitive processes and learning strategies the memorizers believe are involved in their memorization.

While behaviour is observable, cognitive processes are not and as my thrust was on mapping out the unobservable, the investigation and probing had to be carried out through questioning the participants. There were two options here: to question the participants in groups i.e., Focus Group discussion, or in a one-on-one interview. Focus Group discussion as a research methodology, however, is more appropriate for gathering data that can benefit from the group dynamics. Where the insights of individuals are concerned, group work risks sacrificing important information, particularly where it is useful to follow up in detail on something that is said. As my research is looking into individual and not group perspectives, Focus Group discussion was eliminated as the preferred method for eliciting data.

5.1.2 Interview as a data-elicitation method for this study

The most appropriate methodology for the purpose of this study was face to face interviews with my participants. Interviewing provides us the means not only to document the knowledge/insights and attitudes of the interviewees but also to infer their cognitive system (psychological perspective). Interviewing people individually offered me the opportunity to investigate their beliefs about effective learning strategies to retain the text over the long term.

The interviews were semi-structured with a lot of open ended questions. Semi-structured interviews are flexible enough to allow the researcher to discover a variety of opinions and views and yet keep the focus on the research questions. There were occasions when the respondents replied to one of my questions and I followed up on what they said and asked more questions to dig deeper into relevant issues. I let them speak uninterruptedly; however, when required I directed them back to the issue under discussion. Questions were phrased in neutral words, trying not to lead them to a particular answer. Yes/no questions were largely avoided because the interviews were meant to elicit detailed accounts of the memorizers' practices and experiences. Care was taken to put the questions in simple words. While some questions were short, others were a bit long as the concept had to be explained in advance of the question. Questions were put together by themes and were divided into the following five

sections: (a) warm-up questions; (b) basic information about Quran memorization; (c) questions about mistakes during memorization and recall; (d) questions on memorizing strategies; (e) questions on the special features/characteristics of the text and memorizers (See appendix A for the interview schedule).

Special care was taken to avoid any face-threatening questions. Therefore several questions were asked indirectly, that is, questions were sometimes about what other memorizers did, or might do, rather than about the respondent's own practices. This was done under the assumption that participants might not be forthright in sharing their own experiences, particularly in relation to making errors in the sacred text. Indirect questions can also give the participants an opportunity to distance themselves from the issues under discussion. According to Codo (2008):

> One technique for phrasing sensitive questions is to allow the interviewee to distance him- or herself from the themes discussed. Using formulae like "There are people who say/think that …," "Do you know of anyone who…?" may be useful (p.168).

It was expected that by talking about the practices and experiences of others, interviewees would also bring their own perspective on the matter by relating it to their own practices. This, however, is not to say that direct questions were not asked. In fact, where it was judged feasible, direct versions of the questions were used. All the interviews were recorded with the participants' permission using a digital voice recorder. It is important to note that the views shared by memorizers in the interviews are at best their personal opinions and might not even be what they really believed. The claims are therefore not necessarily representative of other memorizers.

As explained below, the interviews were conducted in Pashto and Urdu. Seven of the informants had little or no English (four of the UK based could speak some English, none of the Pakistan-based ones could speak any). As I speak the languages of my participants and share the culture with them, I translated the interview data from Urdu and Pashto into English. Every effort was made to be as faithful to the ideas and the language of the participants as possible. As the purpose was to report correctly rather than literally, concepts and meaning have been given priority over the wording. Having said that, it is neither possible nor is it claimed here that I have perfectly translated from one language into another.

This is, however, not to say that wording of the interviewees have been taken lightly or for granted.

5.1.3 Participants

I decided that participants, all of whom would be non-Arabic-speaking Quran memorizers, should speak a language that I knew myself and be from a culture that I understood. Also, I wanted the participants to be able to speak in their mother tongue so that they could express themselves fully. Pashto which is my mother tongue was, therefore, selected for the purpose. Two informants, however, were native speakers of Urdu.

Urdu and Pashto are closely related, and educated Pashto speakers are familiar with Urdu. Both languages contain some Arabic borrowings in their vocabulary, either directly or via Persian, and such items could offer opportunities to affix meaning to words in the Quran.

Table 5.1 gives a simple illustration of how Arabic vocabulary features in Pashto and Urdu. Ten examples of frequent vocabulary that feature in the Quran are listed. The point is to show where a Quranic word might be understood from the L1—the word for *book*, for example, is cognate in Urdu but *write* is not and the Arabic word *makaan* has a slightly different meaning but is obviously related. Meanwhile, there are words in the Quran that an Urdu or Pashto speaker would not recognise, such as rajul—man and wajada—to find.

English	Classical Arabic	Modern standard Arabic	Urdu	Pashto
book	kitaab	kitaab	kitaab	kitaab
to write	kataba	kataba	likhtaa	likal
place	makaan	makaan	[makaan = house]	kur
man	rajul	rajul	mard	saray
God	Allah	Allah	Allah	Allah
to say	qala	qala	kehna	wayal
faith	eman	eman	eman	eman
fear	khauf	khauf	dar	yara
to find	wajada	wajada	milna	muntal
prayer	salah	salah	namaz	monz
hereafter	alakhira	alakhira	akhirat	akhirat
sky	sama'a	sama'a	asmaan	asmaan

Table 5.1: **Some examples of frequent vocabulary that feature in the Quran**

Table 5.1 suggests that Pashto and Urdu speakers might have some opportunities for finding semantic hooks in the Classical Arabic text. The level of such potential was kept minimal by checking that informants had not studied Arabic. Although some had studied Arabic after the completed their Quran memorization (see below), none had done so before or during memorization.

One of the most important challenges was to find appropriate participants. That is, people who could reflect on and articulate views about their memorization. As I was interested in knowing the *processes* involved in memorizing the Quran, I looked for participants who had not only memorized it but were also involved in training/teaching young memorizers. I believed that in a dual role of being a memorizer and a teacher, they would be in a better position to reflect on the processes and practices involved in memorization, compared to non-teacher memorizers.

Eight memorizers were interviewed for the main study and two memorizers for a pilot study. (A pilot study was conducted to determine the feasibility of the main study and to test and

improve the quality of interview questions. See section 5.4 for results of the pilot). Provision had been made to interview more, but the responses were so similar that it was judged unproductive to recruit more people. This gave me more time for the second part of the study (see chapter 7).

Five of the participants were sighted memorizers while three were blind. Since the research literature indicates that text memorization can benefit from visual reference to the written form, it was anticipated that this might also be an approach used by Quran memorizers. However, it is not at all uncommon for blind people to become Quran memorizers, so Quran memorization, clearly, is not always reliant on this technique. In order to gain some insight into this factor, it was, therefore, decided to interview some blind memorizers alongside the sighted ones.

Sighted memorizers were those who had normal eyesight: they could read the text without any visual aids other than, if necessary, prescription glasses, and had memorized the text by looking at the book; blind memorizers, on the other hand, had lost their vision in early childhood and they confirmed they had not seen text in written form and had memorized the Quran by listening to their teachers.

All participants were adult male. Although women do memorize the Quran, I wanted to focus exclusively on men to avoid the variable of gender which could potentially confound the results. Moreover, given gender segregation in Muslim society, especially in religious circles and the protocols associated with it, gaining access to women memorizers would have been difficult. However, I believe that the broader processes involved in memorization could be applicable to women memorizers too.

As mentioned, all participants were non-Arabic speakers, that is, Arabic was not their mother-tongue. They did not speak Arabic at home, nor did they speak it in their daily lives. The contact with Arabic was the Classical Arabic they used for religious purposes: they recited the Quran on religious occasions (mostly during prayers). Two of the participants said that they interacted with Arabic speakers in their localities if situation so demanded. So, they were mainly speakers in the literal sense of reciters.

The sighted participants were based in different mosques in Cardiff, Wales, UK. They were born in Pakistan and had completed their memorization of the Quran in their country of birth. As noted in the beginning of this section, my participants were also teachers of the Quran. An important benefit of interviewing teachers in the UK was that they had experience of teaching in two different countries and thus could give a broader picture of memorizing practices from Pakistani culture on the one hand and Pakistani Muslim culture in the UK on the other. The three blind memorizers were from Khyber Pakhtunkhwa, Pakistan and were interviewed there. Although I searched for Pashto/Urdu speaking blind memorizers in Cardiff, I could not find one. One of the sighted participants told me about a blind memorizer in London but he could not be contacted. I, therefore, went to Pakistan to interview the blind memorizers. I met every participant two times: (a) first, to introduce myself and my research and to discuss time and place for the interview; (b) second, to conduct the interview.

Early contacts with participants in Cardiff were made through a personal friend. A couple of meetings with a teacher-in-charge of one of the mosques in Cardiff led to contacts with more participants in other mosques in and around the city. In all cases the teacher-in-charge in the respective mosque was contacted first and the research interest was explained to him. The blind memorizers in Pakistan were approached through my personal contacts.

Three of the sighted memorizers were trained as scholars in Islamic Sharia and had studied Arabic as part of their training. According to them, however, their training in Arabic took place after they had completed the memorization of the Quran. The other two sighted and the three blind memorizers had not studied Arabic. Their use of Arabic was restricted to performing religious duties, especially prayers.

All participants liked the idea of talking about their memorization and said that they had never talked about their memorization in this way before.

Although this study is concerned with the non-Arab speaking memorizers' reflections and perspectives on the Quran memorization, I also had an informal chat with two native Arabic-speaking memorizers-teachers. The conversation with the native speakers was conducted in order to get a holistic picture of the processes believed to be involved in memorization, and not to conduct a comparative study on the differences and commonalities between the native and non-Arabic memorizers. As the native Arabic speakers are not my primary source of

information, I will, therefore, refer to conversation with them only very briefly in the discussion section of this chapter. A consent form (duly approved by the Ethics Committee of Cardiff University) was given to the participants to sign, saying that they agreed to my using the data for research purposes. The consent form was translated in Urdu and Pashto. Blind memorizers were read out the consent form and were told that they could leave the interview any time they wanted.

5.1.4 Pilot Study

A pilot study was carried out to establish the length of the interview, to find about the questions the participants might find sensitive, and whether it mattered if they had memorized the entire Quran or not. In addition, I wanted to know the sorts of answers the memorizers would come up with and which wordings of interview questions didn't work and needed changing.

Two memorizers were interviewed in London. Both were my acquaintances, were Pashto speakers and were ethnically from Khyber Pakhtunkhwa, Pakistan and had been living in the UK for seven years. The interviews were conducted in Pashto and unlike the main study where participants were interviewed in the mosques, participants in the pilot study were interviewed at their respective residences (see below).

The pilot study proved to be very advantageous as it afforded me an opportunity to check the procedures before carrying out the main study. A couple of questions were taken out because they were asking for the same information. Also, wordings and the order of some questions were changed to make the interview schedule tidier, more precise and structured for the main study. Moreover, although the pilot revealed a couple of questions to be redundant, I kept them as back-up aids for my main study as I was not sure if the participants of the main study would behave the same way as the pilot participants. In a couple of interviews in the main study these back-up questions had to be used to elicit the required information.

The pilot drew my attention towards some unexpected behaviour of the human participants and made me mentally ready for any unseen manner of action or reaction from them. For example, the first participant refused to be voice-recorded, the interview with the second participant was disrupted a couple of times as he had to go out to answer a phone call.

Although both these situations were a bit frustrating because I did not expect any such inconvenience, it prepared me for any unexpected behaviour or interruptions in the main study. I would, therefore, go for every interview with the idea that the interviewee might not want to be recorded and that I should be ready to efficiently and carefully take notes while he spoke. No participant in the main study refused to be voice-recorded, though. The most important contribution of the pilot, however, was that in their conversation the pilot participants referred to the role of the visual image of the Quran that gave me the idea to talk to blind memorizers.

In terms of length of time, one interview lasted for 80 minutes, the other for 75. As some questions were taken out from the interview, the total time for the interview in the main study was one hour. It was in the light of the pilot interview that I had to change the location of the main study. Unlike interviewing the pilot participants at home, memorizers in the main study were interviewed in the mosque because, firstly, in the mosque there is least interruption from the outside. Secondly, while it was appropriate to interview the participants of the pilot study at home because I knew them, I wanted to use the mosque for interviewing strangers.

In the light of the minimal changes made, and due the comparable nature of the pilot and main studies, responses from the two pilot participants are included in the main data set. The total number of participants is, therefore, 10.

5.1.5 Procedure

The interviews were recorded with the permission of the participants in a room adjacent to the main praying hall of the mosques using a digital voice recorder. Despite recording the interviews, careful notes were made of the important points in case of problems with the recording later on. To ensure that all participants came up with their own personal experiences, and were not influenced by the thoughts of their fellow teachers, they were requested not to share the interview details with those who were not yet interviewed, to which they all agreed. Each participant was interviewed on a day of his choosing, depending on his availability and the time at his disposal.

Normally I listened to and selectively transcribed the conversation on the day of the interview. I would listen to the interview one more time after I had transcribed it to make sure that nothing important had been missed. I read and reread the interview transcripts for finding out key concepts.

The data were coded as follows: as a first step, each participant was labelled with a unique number. While all sighted memorizers were put in one group, blind memorizers were put in another group. The answers to any given question were listed together, so that the range of responses could be easily seen and compared. Information thus pooled from participants under different interview questions were then organized under relevant themes or research questions. This approach meant that when my participants said something in reply to one question that was more relevant to another, it could be moved to the most appropriate place in my analysis. The data were analysed by comparing and contrasting memorizers' description of their experiences and perspectives on the processes of memorization and recall with findings from literature on memory for language. The findings are reported under theme headings in section 5.2.

5.2 Data analysis

The data analysis will be reported in relation to strategies the memorizers said they adopted to memorize and retain the Quran text over the long term and how effective these strategies/practices are for their purpose. The account will highlight key issues involved in Quran memorization from the perspective of the Quran memorizers-teachers used in this study.

The empirical investigation is driven by the following research questions:

(1) What are the main techniques for memorizing the Quran?
(2) What sorts of errors do the informants consider common?
(3) How different or similar are the sighted and blind memorizers in their memorization practices?

5.2.1 The making of a memorizer: laying the foundations

The informants reported that before starting memorizing the Quran, memorizers are taught Arabic letters and sounds, and how to make 'words' out of them. This learning of 'words', however, is restricted to phonological form in that they do not learn the meaning (signified) or translation of words and rather only focus on the form (signifier). This is a pre-memorization stage where learners (almost all Muslim children) acquire knowledge of letter-sound relationships in Arabic. At this stage they are only concerned with how to pronounce or read out 'words'. This process starts at quite an early age of three or four and learners internalize the word structure/phonotactics of the Classical Arabic without reference to meaning. According to the Quran teachers-memorizers:

> That is how the foundations of Quran learning are laid. Students are taught to recognize and pronounce Arabic letters. Then they are taught to arrange letters and sounds into words. They imitate their teacher in saying Arabic words. Initially, they may find it difficult to combine letters and sounds, but they gradually learn it (SM01).

> I teach them to pronounce Arabic letters like native Arab speakers. Once they have got knowledge of how to form and articulate Arabic words, they move on to the reading of the Quran text, and complete reading the entire Quran before beginning the memorization. Children make few mistakes in pronouncing the words if they are grounded well in the sound system of Arabic (SM02).

The aspiring memorizers have thus already completed reading the Quran text before embarking on memorization proper, and are familiar with phonology (sound), orthography (written form) and phonotactics (word structure) of Classical Arabic in that they fluently 'read' the Quran. Once they have achieved this basic proficiency in reading Arabic in general and the Quran in particular, they are ready for memorization.

This method of learning the Quran is in keeping with findings from literature on committing information to memory. In chapter two it was shown that familiarity with lexical and phonological properties of a language enhances the processing capacity of phonological short term memory, resulting in a greater learnability of language (French 2006; French and O'Brian 2008). Gathercole (1995) had shown that familiarity with the phonotactic structure

of words yields better learnability as compared with words with which the learners are not familiar. According to Ellis and Sinclair (1996), similarity of phonotactic patterns between the learners' native language and the to-be-learned foreign language is an important factor in the learnability of words: repeating and remembering words that share phonotactic structure with words in one's native language are easier than ones without such similarity. Learning to 'read' Arabic at quite an early age, can thus be said to have benefitted the Quran memorizers in committing the text to memory.

This early attention to the phonology of the Quran text indicates the importance of accurate pronunciation in tradition of Quran memorization. If one can't read the letters and pronounce them correctly, one could easily introduce errors that would then be passed on to the next generation of memorizers until there was more than one version of the sacred text. Moreover, this basic knowledge of Arabic phonotactics might help them in chunking sounds and letters into 'words', 'words' into phrases and phrases into verses, leaving more capacity in working memory. That is, memorizers' knowledge of Arabic phonotactics enables them to arrange sound patterns into predictable and pronounceable (intelligible) word sequences and longer stretches of text.

Once they have completed their 'reading' of the text, they embark on memorization proper. The practice of Quran memorization is in line with what Moore (2006) calls 'guided repetition' which "involves modelling by an expert and imitation by a novice, followed by rehearsal and performance by the novice" (p. 110). According to informants, memorizers normally but not necessarily start with the last Part of the Quran, because:

> The last Part has short chapters which are easy to memorize. Not only are chapters short but the verses therein are short too. The short verses rhyme with one another and are easier to memorize than the long ones (SM02).

> Starting with the last Part has a psychological effect on the memorizers. There chapters are small in size and it takes a short time to complete a chapter, giving them a feeling of having completed a certain number of chapters (SM03).

Almost all Quran memorizers begin young. My participants had a consensus on a difference between young children and adults in memorizing the Quran. According to them, starting early in life improves the outcome in terms of time taken to memorize the text, how well it is learned, and the accuracy of pronunciation. According to two teachers:

> Memorizers in the UK normally start at the age of 9 or 10 which is the right age for memorization. They normally finish at the age of 16 or 17. Late starters are rare and they take longer to memorize. Children have better memory as compared to older children/adults for various reasons. Adults have family and other responsibilities which distract them from focusing on memorization. There, however, may be some rare exceptions to this. I know some people who have successfully memorized the Quran despite having started in their twenties and thirties (SM04).

> It is important to start memorization early in life. The right time for memorization is the age of 8 or 10 years. When you start early, you take shorter time to complete as opposed to late starters. At a younger age, you are not committed to other duties and the mind is not occupied by worldly things (SM03).

The emphasis and the practice of starting memorization early in life coincides with the notion of brain plasticity in that changes in neural connections and the ability to learn information in general decays with age (see chapter 4). Children complete the process within a short period of time and remember it better, compared to older children or adults.

Three informants had this to say:

> Normally, a young memorizer completes memorizing the Quran within two to three years. Some memorizers complete it within one year, and some, although very rarely, in six months. However, in the UK, memorizers may sometimes take 4 to 5 years due to the school work. It depends on how much time you give to memorization. Late memorizers are rare and they take longer to complete it. Also they may not remember it as well as the young memorizers. I can tell you this on the basis of my experience with memorizers of different ages. Late starters struggle when it comes to memorization and remembering (SM03).

> Memorizers daily memorize in the Mosque for three hours, six days a week. A full time Madrassah (a religious school) student, however, spends six to eight hours memorizing the Quran. Sometimes students leave school for a year or so to give full time and attention to their memorization. In such cases they normally complete it in a year. I don't know many memorizers who may have started late but I know one person who started at the age of 30 but he could memorize only 12 Parts (SM04).

It needs to be noted that some learners memorize the Quran in exceptionally short time which might be the result of differences in individuals' aptitude:

> There are individual differences in personal ability to memorize a text. I, along with two other friends of mine, started memorizing the Quran at the same time and same age. i.e., 11. While I and another friend took almost three years to complete it, the third friend completed it within eight months. I know a person who successfully completed memorizing the Quran in 55 days but people like him are exceptionally rare (SM05).

5.2.2 Repetition and rehearsal—a key to the Quran memorization

From interviews with the Quran teachers-memorizers it was clear that they consider phonological memory as their primary mode of learning. They repeat and rehearse the text to lodge and maintain it in memory because they do not have *meaning* to help them in their memorization. In everyday life while people could repeat information they do understand, they normally use semantic memory to help. In situations where semantics is not available, repetition takes the primary or predominant role.

All participants in this study had a consensus on the central role of repetition as not only a means of committing text to memory initially, but also to refresh and consolidate it for long term recall. Repetition and rehearsal, according to them, are an inherent part of their memorization. One of the teachers said:

> There are no skills or sets of skills for memorizing the Quran. Rehearsal and repetition are the only strategies to memorize and remember Quran (SM02).

> I do not know Arabic. I have read Quran with translation but that was many years after I had completed memorization. When I was memorizing Quran, I would repeat it numerous times to remember it. Every morning I would rehearse my lesson from the previous day twenty times. My teacher said to me that if it takes you ten rehearsals to memorize a verse of the Quran, rehearse it fifteen times (SM01).

Memorizers' views on the role of repetition resonate with findings from literature according to which repetitions strengthen neural links in the brain leading to the consolidation of memories (Nader et al 2000). Repeated and frequent rehearsal as reported by the Quran memorizers may thus have left permanent traces in their brain resulting in efficient/entrenched memory of the text. The emphasis on the role of repetition and rehearsal in memorizing and remembering the Quran is in keeping with Ellis and Sinclair (1996), and Ellis' (2001) claim that repetition of sequences in STM is necessary for chunking in phonological LTM as well as consolidation of information in LTM (see chapter 6 for more discussion on this).

Conversations with the participants also revealed that the memorization is done in a structured way. Each day, before memorizing a new lesson, memorizers revise/rehearse a lesson from the previous day. Then the new lesson is memorized to a point where it is recalled without an error. The next day the same process is repeated: revising the text from the previous day and adding to it by memorizing some more. In addition to this, a memorizer regularly revises text memorized over the last, say, 10 to 15 days. Referring to this mode of memorization, a teacher said:

> A learner is assigned a portion of the Quran to memorize, depending on his ability, and the time he has on his hands, and the efforts he is willing to put in. The next day, he recites it to a teacher, and if there are errors in recall, he is asked to memorize it to an errorless recall. Additionally, a memorizer daily recites some portion of the text memorized over the last 30 days (SM01).

Some teachers make the rehearsal schedule even more rigorous. According to a teacher:

> My practice is that a learner who has memorized 20 'parts' will daily rehearse five 'parts'. This is in addition to daily rehearsal of lessons learned over a week (SM02).

From what the participants said it is clear that there is a method in their memorization. They do in a structured and methodical manner. The whole book is memorized incrementally and rehearsal is distributed over set intervals. This is in line with findings from literature according to which optimal learning happen when distributed over time as compared to massed practice (Bjork 1988). These views are also in consonance with accounts of Quran learning reported in Boyle (2006), Gent (2011), and Moore (2006, 2008).

Referring to the actual way of memorization, the interviewees said that the memorizers look at a verse and say a part or whole of it, depending on its size, several times. Then they look away and try to say it again. They only look back into the Book when they find that they can't remember a particular word or phrase, and focus on that bit, and just practise that little bit a few times, then they try to put it back into the whole. They look away and if they can't remember a part—the same part or a different part, so they look at that and memorize it. So, they piece together parts of a verse. Once they have memorized a verse, they move on to the next verse and say it along with the previous verse.

It is important to note that for the Quran memorizers a verse—a short subdivision of the Quranic text— is a basic chunk of memorization. A verse may consist of one, two, or more sentences, often of unequal size. Although the meaning of a verse may flow into the next verse to complete the sense, it is a structural unit in its own right, with a beginning and ending. A chapter of the Quran is neatly divided into verses of different sizes with a sign of a circle at the end of each verse.

The informants were explicit about the role of a verse as a unit of memory. According to them, the memorizers know the physical boundaries of verses and are aware of where a verse starts and ends. With the passage of time, chunking and memorizing becomes easy because the to-be-memorized verses contain words and phrases which the memorizers have already come across. Two memorizers had this to say:

> Memorization appeared difficult in the beginning. I was afraid that I would not be able to do it. Initially it would take me a lot of time to memorize and I would quickly forget what I had memorized. But after some time it was not that difficult. After having memorized five Parts, I got used to the style and language of the Quran. There are lots of phrases and verses that get

repeated at various places in the Quran and I gradually got familiarized with them. With the passage of time, I managed to memorize three to four pages per day (SM03).

The Quran has a unique language. An important thing about Quran memorization is that you need to get used to the language of the Quran. There are words and verses that you repeatedly come across quite a lot. As you get to know them more and more, memorization becomes easy (SM02).

As they memorize, verses are connected with verses, chapters with chapters, and Parts with Parts, until the whole of the Quran is memorized. This is in line with Ellis' (2001) description of chunking described in chapter 3. This indicates that the Quran is memorized as a series of subtexts and subparts in a hierarchical manner: memorizers organize their memory of the text in terms of chunks of various sizes (smaller to larger) and memories of the text are laid down along structured lines. This also means that as they go along, their learning and retention capacity gets larger as compared with when they were novices. With the passage of time they develop better organizational skills for storing information, as they relate the to-be-remembered verses to the already memorized ones. In this way they behave like 'experts' or skilled performers.

We remember from chapter 3 that chunking is based in semantics. One can organize information into chunks if one has available knowledge of the language system—meaning, word order and phonology, etc. However, it was also noted that features such as familiarity with the phonotactic characteristics of a language and word-likeness can also help in chunking text in a foreign language.

Quran memorizers' chunking of text, as indicated by conversations with them, is based on the structural and 'thematic' organization of the text. Because the Quran is already marked into several divisions of different lengths, memorizers use them as 'ready-made' chunks to organize the text in their memory (see section 5.4). Along with this, the memorizers' early exposure to the text, (i.e. having read it before starting memorization) might have helped them in chunking and memorizing it.

5.2.3 Repetition and rehearsal—a key to retention and maintenance of the Quran text

For the Quran memorizers, repetition is a life-long process and does not end with the completion of memorization of the text. They do it the whole of their lives. They constantly repeat and rehearse to retain the text over the long term. Two memorizers had this to say:

> I recite/rehearse on daily basis, sometimes a 'part' and sometimes half a 'part'. The minimum I rehearse is a quarter or one fourth of a part. I rehearse the whole of the Quran six to seven times a year (SM01).

> Every day I rehearse a 'part'. Normally, I complete rehearsing the Quran in a month, i.e. 12 times a year. Other memorizers may rehearse more or less than a 'part' but everyone does rehearse on daily basis (SM02).

This means that memorizers are involved in a continuous and unending process of recall/retrieval and reconsolidation. Once they have completed the recitation, they start anew. According to them, sometimes some verses or a particular chapter or section of the Quran may need more practice to remember than other. In addition to the rehearsal schedule mentioned above, memorizers do even more rigorous and intense rehearsal during the Muslim holy month of Ramadan.

> In Ramadan (the month of fasting), memorizers double their rehearsal. We rehearse two to three and sometimes five 'parts' per day to be recited in the night prayers (SM04).

This means that memorizers engage in 'private' rehearsal before recitation in the night prayers. Although a majority of memorizers rehearse regularly and frequently, not every memorizer does so. One participant said this:

> I do not rehearse as regularly and as often as other people do. However, I increase rehearsal during Ramadan because I have to recite the Quran during night prayers. I have already rehearsed and recited the Quran so much that it is strongly lodged in my memory (SM05).

This indicates that the Quran memorizers devote a considerable part of their time to memorization: they not only spend thousands of hours to commit the whole text to memory but also keep repeating it all their lives. In chapter 4 it was suggested that it is possible to liken the Quran memorizers' superior memory performance to skilled performers.

Although Ericsson et al's (1993) model deals with skilled performances of musicians, chess players and sportspersons, it sheds light on the Quran memorizers 'expert' memory insofar deliberate practice over time is concerned. Quran memorizers' exceptional memory can be attributed to sheer resoluteness, commitment, and years of hard work. Like skilled performers, as reported by Ericsson and Charness (1994), the Quran memorizers' 'expert' performance is domain specific, i.e. it is limited to their field of expertise and does not go beyond it. My participants confirmed that they don't have superior memory for other tasks. Also, like skilled performers, the Quran memorizers' specific ability at their task is not innate but rather acquired through repeated practice. The informants had a consensus on it. Four of them said:

> No one is a born memorizer. Quran memorization needs time and commitment. You have to work for it. You sweat over it. It needs patience and perseverance. I know several people who quitted after some time because they could not do the required amount of rehearsal. There are people who forgot the Quran after having memorized it because they could not continue rehearsing it (SM02).

> Initially, I had a great difficulty in memorization and I thought I would never be able to do it but gradually it became easier for me. Once you start memorizing then God helps you but you have to work at it. Some people take a short time while others need a long period of time, but in every case you have to put in a lot of effort. Quran memorization is not a one-time task; you have to remember the Quran forever (SM04).

> Memorization of the Quran needs discipline and punctuality on the part of a memorizer. One has to follow a strict and regular routine to complete it. It cannot be memorized in fits and starts. It is a regular and continuous process. I often tell my students that slow and steady wins the race. You cannot cram it all at once nor can you do it by having gaps in the process of memorizing it (SM01).

> Although children of memorizers sometimes memorize the Quran, they don't always. Sometimes the tradition of memorization runs in family but this has to do more with environment and socialization than with inborn ability. Mostly it is due to social interaction and a result of the influence of the father and his memorizer friends (SM01).

It is clear from the participants' account that Quran memorization is not an ability that one either has or doesn't have. The Quran is to be learnt, rehearsed, and remembered for a lifetime. It is a skill that needs training and practice. In a nutshell, it can be said that Quran memorization is more a product of nurture than nature. Given that the Quran text has to be regularly repeated to stay in memory, it might not end up as part of semantic long term memory as semantic memory does not need rehearsal. Instead it may end up in episodic long term memory as proposed in chapter 4 (see the discussion section below).

That repetition is essential to memorize and remember the Quran is also noted by other researchers. Gent (2011) investigating the educational significance of Quran memorization, observed and interviewed memorizers in north-east London. He found repetition an important means to commit the Quran text to memory. In the words of one of Gents' participants: "You can't retire as a *hafiz*." (p. 12). This quote quite nicely sums up the commitment and dedication of the memorizers to remember the Quran.

5.2.4 The role of mnemonics in the memorization of the Quran

In chapter 2 it was revealed that memory for meaning is long-lasting compared to memory for surface features, such as sounds which lasts only for a few seconds (Sachs 1967). It was, however, suggested that various factors, such as phonological patterning (alliteration, rhythm, and rhyme, etc) play a role in retaining the form (Rubin 1995). The literature indicated that poetic text is remembered better than prose (Tillman and Dowling 2007). It was, therefore, predicted that the strong rhythm and rhyme scheme of the Quran text might be usefully and fruitfully exploited by the memorizers. Although the participants of this study recognized a role for rhyme and rhythm in memorizing the Quran, they ascribed their memorization more to help from God than to any poetic devices. In view of two participants:

> Rhyming does not necessarily play a role in memorizing the Quran. It may help a child in memorizing the Quran but not an adult. I memorized the Quran without any awareness of the

> rhyme scheme. Quran memorization is just a miracle of God and one can memorize with the blessing of God alone (SM05).

> Rhythm and rhyme facilitate and contribute to memorization in the sense that one learns a text in a particular rhythm that brings fluency and ease to memorization. Also, reciting it rhythmically makes it appealing to both the reciter as well as the hearer. Quran has a beautiful rhythm and it sounds very musical to the ears. But memorizers are committed to memorizing it anyway and we do it with a help of God (SM02).

It was pointed out in chapter 3 that working memory, due to its limited capacity and the limited duration over which it can hold information is inadequate to explain the memorization of a large text, such as the Quran. However, it was suggested that visuospatial memory supports long term recall of information. It is like an extra tentacle, to use the octopus metaphor again, giving an extra anchor in memory. Interview data from the sighted participants revealed that they encode the text both phonologically and visually.

One participant said:

> Memorizers learn from a copy of the Quran. They have a copy of the Quran in front of them both at the time of learning and in rehearsal. So when they memorize they create a mental image of the page and the text on it. During memorization and recitation, memorizers normally close their eyes. It keeps their attention focussed on the visual image of the written words (SM04).

Another participant said:

> I picture words on the page when I recite from memory. I have got a photographic memory (SM03).

This means that sighted memorizers make a very strategic use of the printed form of the text by hooking the fleeting phonological memory into a concrete visual image. By linking up sounds and visuals of words, a unified memory representation of the text is made. The printed form is thus used as an external aid to memory, a sort of mnemonic link. In other words, the pictorial representation provides them with a cognitive mnemonic anchoring for a long term representation. While recalling, they scan the text in their heads as if reading from the actual

written text. It suggests that their retrieval is based on both attributes (i.e. sound and picture) of the word.

There is, however, something specific and, in a way, unique to the Quran memorizers' visuospatial memory. According to the informants, they memorize from a particular copy of the Quran which they keep with them as memory guide/aid for later occasions.

Two of the Quran teachers-memorizers had this to say:

> A memorizer normally uses a particular copy of the Quran which in a certain way helps him remember the text. For example, I have memorized from a copy having 13 lines on each page. This particular image of the page with verses written in a specific way is entrenched in my mind and helps me in recall: I visualize the page and read from there (SM05).

> Memorizers normally use a particular copy of the Quran with a particular page lay-out and design. They memorize the whole map, the beginning, middle, and the end of the page. A memorizer usually keeps with them the same copy from which they have memorized. While reciting from memory, they visualize the picture of the page in their mind with all the physical details of the text. If they make a mistake in recall, they visualize the page from which they are reciting and try to correct themselves by mentally locating words on the page (SM04).

Memorizers may find it difficult to do without such a 'personalized' copy of the Quran. Referring to this phenomenon, a participant related a particular incident from his life:

> When I recite, I visualise the whole page in my mind's eye. I moved to the UK when I had already memorized the Quran. Because I had left behind the copy of the Quran from which I had memorized, I found it difficult to rehearse using a copy with different font, colour, and line number. My recitation remained poor and my parents were worried about my not reciting well and they thought I had lost interest in rehearsing the Quran and was therefore not paying attention it. They became satisfied only when one of my teachers had explained it to them that there was nothing to worry about. Ultimately I had to send for that particular copy of the Quran from which I had memorized (SM04).

Another teacher said:

> Keeping the page in mind is not necessary for recalling but we have a sort of idea of the location of the text on the page when we recite from memory (SM05).

It suggests that the memorizers' personalized copy serves as a mnemonic link for remembering the text: they mentally photograph and visualize the whole of the Quran text in their mind. It is like they have a copy of the Quran stored in their mind to which they have access around the clock.

The above finding is in line with the dual coding theory (Paivio 1971; 1991), according to which double coding leads to superior recall compared to single coding. Given what the participants said regarding the function of printed text in memorizing the Quran, it can be claimed that they create a 'semantic' or mnemonic hook (a visual link) as a proxy for meaning, not only to increase their short term memory but also to transfer the text into long term memory. It means that they make up for the missing meaning component by substituting the meaning of the text with the image or printed form of the word as proxy for meaning.

The views of the participants and the interpretation above are also in line with Baddeley's (1986) model of working memory (see chapter three). In the light of Baddeley's model, it was predicted that the Quran memorizers might be integrating phonological and visuospatial information of the text for a holistic and unified representation in memory.

It was noted in chapter 4 that mnemonics such as the keyword method or the method of loci are consciously taught to learners to enhance their memory for a variety of information. It was noted that mnemonic techniques mostly result in better retention of information over time as compared to rote-learning. One would have therefore expected Quran memorizers to use some sorts of mnemonic method to retain a long text. Quran memorizers however reported that they are not taught any mnemonics to enhance their memorization. When I asked them if they on their own use any particular mnemonic technique to beef up their memory, their answer was in no. According to them, repetition was their way of memorization.

5.3 The blind memorizers—a class apart

So far we looked at data from sighted memorizers in relation to what they do to memorize the Quran. Just when we thought we understood how Quran is memorized, we have another set

of memorizers who are completely blind: they have never seen text in written form and cannot, unlike the sighted memorizers, link sound to the visuals and yet they memorize and recite the Quran as well as the sighted memorizers. So, what do the blind memorizers do instead, to shore up the phonological memory?

Two blind memorizers had this to say about their memorization practices:

> In the initial days of my memorization, I memorized a word or two per day but gradually increased the amount to a verse through two verses to a whole Ruku[6]. I would listen to a verse 15 times and would then repeat it 50 times. The next day I would rehearse the previous lesson and would add to it by memorizing more text (BM01).

> My teacher would recite a word and I would say it after him and then I would rehearse it 20 to 30 times. Then he would say another word and I would do the same. I would then say the two words together and would rehearse it for 20 to 30 times. This way I would memorize a verse. The more I repeated and rehearsed a verse, the more I learnt it (BM03).

> I rehearse daily. The minimum I recite is a 'part' of the Quran. This way I complete the whole of the Quran in thirty days i.e. twelve times a year. Other memorizers may rehearse half a part or more than a part. If I stop rehearsing or if I don't rehearse for long, I may not recall it correctly (BM02).

This suggests that the difference between the blind and sighted memorizers in terms of their memorization is not qualitative but quantitative. The blind memorizers repeat more, at least while they memorize the Quran, than the sighted ones. Unlike sighted memorizers who use a visual link as a possible replacement for semantics, the blind memorizers' only means of memorizing the Quran is phonological. This means that the notion of a visual image as a semantic/mnemonic link cannot be the only way to retain and maintain the Quran text over the long term. However, as we know that phonological memory is short-lived, it ought, logically, to be impossible to commit the Quran text to memory using only the sounds of its words. So, how do the blind memorizers remember it over the long term? Do they also

[6] The Ruku is a subdivision of the Quran referring to a portion of thematically related verses. This system, however, is mainly South-Asian in nature and is not universal.

anchor their memorizing in something as a substitute for meaning? According to the three blind memorizers:

> I remember the style, pronunciation, and tone of voice of my teacher. Every detail of his voice resonates in my memory. I copy his style and I feel he is sitting near me and listening to me when I recite (BM01).

> In contrast to sighted memorizers who have a copy of the Quran to memorize from, a blind memorizer's focus is on the tone and voice of the teacher. As he hears his teacher says a verse or part of a verse, he repeats after him (BM03).

> During memorization all my attention used to be on the voice of my teacher. I listened to the words and the rise and fall of his voice. My ears caught every word my teacher uttered (BM02).

> When I recite, I imagine as if I am walking up and down the hill. Sometime I feel as if I am walking through an orchard or a desert. Different verses evoke different feelings and sensations, but I cannot express what I feel or imagine. I do not have words for that. It is hard to describe (BM03).

Insofar as these informants are representative, it means that blind memorizers elaborately process non-semantic information, such as physical quality (i.e. tone, pitch, etc) of the voice. They also associate the sound of words and the feeling thereby generated, with objects/images and concepts in their imagination. However, there, is a difference between sighted and blind memorizers insofar imagining/forming an image is concerned. That is, while the sighted memorizers' images are visual, blind memorizers' might be touch and sound based. The relationship between object and concepts in case of the blind memorizers might be more arbitrary as compared to sighted memorizers' where a corresponding relationship exists between the written and spoken forms.

In light of the conversations with blind memorizers we can pretty well understand the role of the mnemonic hook. Blind memorizers create or imagine a hook and hold the sound onto it. Or they use the mnemonic hook (i.e., something other than semantics or visual information) as a means for finding the remembered information. Unlike the sighted memorizers, who have a mnemonic hook available to them in the shape of the printed words (i.e., a visuospatial

link), blind memorizers imagine a link for themselves. This suggests that different hooks can be used, according to different modes of memorization. It is also possible that blind memorizers, being solely dependent on their hearing faculty, may have more developed listening skills than the sighted memorizers.

There does not seem to be a fundamental difference between the blind and sighted memorizers' rehearsal routine. After the Quran has been memorized, both sighted and blind memorizers are engaged in almost the same amount of rehearsal on daily basis. The difference is only in the mode of memorization: sighted memorizers, in addition to being engaged in regular and frequent rehearsal to help retain the fleeting phonological information, also use the visual image. So, it's just a different way of doing memorization and remembering. It may be noted that sighted memorizers primarily memorize from a printed copy of the Quran: they read from a page. Blind memorizers, on the other hand, memorize by listening to their teachers.

5.4 Is memorizers' efficient memory all about rehearsal and repetition?

All of the Quran memorizers (i.e. sighted and blind) have available to them another potentially strong cognitive link for a long term recall i.e., the organizational structure of the Quran. The Quran as a text is organized in a structured way and both the sighted and blind memorizers said that they fully exploit the structure of the text for long-term retention. Structurally, the Quran is divided into thirty (30) parts called "Juz". Each "Juz" has a name or a title and is divided into four equal parts called quarters. The Quran is also divided according to subjects, called Suras or chapters. There are 114 Suras/chapters of unequal size with different titles/names. Moreover, there is a fixed sequential order in which the Quran is organized in terms of verses, Chapters, and Parts. A memorizer knows all these details as part of his memorization. It means that when he memorizes a verse, he also memorizes where it is on the page and in which Part/chapter/section. It may be likened to locating book in a library: learning not only what books you have on your shelf, but where to find them. However, this ability of knowing where a particular verse occurs in the Quran may not be equally available to all memorizers: some of them may be better at knowing and remembering this information than others. This was clear from conversation with participants. Two of them said this in the following words:

> If you give a memorizer a line or two as a cue from anywhere in the Quran, he cannot only recite what comes after the cue but can also give you the exact location of the verse, that is, the chapter and the Part it occurs in and whether it is in the start, middle or end of the chapter or a Part (SMP2).

> Once a person challenged me on my memory of the Quran. He said that he would recite a verse from anywhere in the Quran and that I had not only to recite what came after that but had also to name the chapter and Part it belonged to. He tested me on thirty-five different verses from across the Quran. I not only correctly recited all the verses but also provided the details about a verse location in the Quran (SM04).

Practical manifestation of the above faculty as reported by participants was provided when I asked memorizers to recite in response to a verse I recited for them. I would recite a verse or a few words from a verse at random from anywhere in the Quran and would ask a participant to recite from that point onwards. He would immediately start reciting and would continue until I asked him to stop. In addition to this, he would correctly tell me which Chapter and Part of the Quran the verse was from and whether it was in the beginning, middle or the end of a Chapter or a Part. However, when I would give them a single word as a cue, they would find it difficult to recite from there onwards. They would say that the cue word existed in several places in the Quran and they were not sure which particular verse began with that particular word. However, when I asked them to recite any verse starting with that particular word, they would take a while but were able to recite the verse. On the whole, one word was not a reliable cue for them. Even a phrase at times was not a sufficient recall cue, because a phrase sometimes occurred in too many verses to be a strong and differentiating cue. Memorizers would, therefore, ask for a complete verse or a couple of verses as a cue. It would not be out of place to mention that the size of a Quranic verse is variable and may change from very short (i.e. consisting of a few words) to very long (i.e. consisting of several sentences).

This suggests that it is a verse which normally counts as unit or chunk of memory for the Quran memorizers. Secondly, verses might be stored in memorizers' memory in a coherent, orderly and sequential manner and not in form of fragmentary and disjointed bits and pieces such as isolated and random words in a list-learning situation. The memorizers' quick recall of the text in response to a verse cue also shows that they had gained a certain amount of automaticity which might be a result of extended practice.

In Chapter 4, it was suggested that some 'surface' features might end up in long term memory by means of deep cognitive processing. From what the participants said, it can be argued that another 'surface' feature i.e., knowledge about the structure of the Quran text might have been deeply processed, and used to lodge the text in long term memory. Certainly it seems that the memorizers have internalized structural schemata of the Quran text to guide their retention and retrieval of it.

In addition to their knowledge of which Chapter or Part a verse is located in the Quran, the memorizers also seemed to have a mental map of the Quran text. They not only knew the structure of the Quran at a global level (i.e., how many Parts and Chapters there are and in what order) but were also familiar with it at a local level (i.e. where a Part or a Chapter begins and ends and where a quarter or half of a part is). This means that while memorizing the Quran, they memorized three things: the text itself, where it is located in the Quran, and the overall map of the Quran.

They thus seem to have internalized the Quran in an interconnected, integrated and coherent form in a hierarchical manner, forming a neat representation of chunks at different structural levels. Might it thus be possible that their efficient retrieval is based on this organizational structure? According to one participant:

> Knowledge about the structural organization is not essential to memorization but it helps in so far as memorizers organize the text along systematic sequential lines. The organizational structure is general knowledge to all memorizers because all of them know about the structural make-up of the text. This is part of their memorization process because they memorize a text in the form of verse, a chapter and Part, every division making a chunk of different length and size (SM05).

> Generally, memorizers memorize the Quran verse by verse, chapter by chapter, and Part by Part. Once a chapter has been memorized, the chapter next in order is started, and once all chapters in a Part are memorized in a sequential order, the next Part is taken up for memorization in the same manner. The whole Quran is learnt in this fashion. A memorizer knows the boundaries of chapters and parts so that he is aware of where one ends and another

> starts. Memorizers see the Quran in both its totality (i.e. as one whole) and also in terms of different structural divisions/components (SM03).

This suggests that the Quran exists in the memorizers' memory at several concrete levels, ranging from verses to the chapters through to parts to the whole of the text. The Quran text, due to its inherent structure and organization, thus seems very chunkable: different structural divisions, varying in length, serve as chunks in their own right. Every chunk at a lower level makes up a part of the chunk at a higher level. This facilitates the memorization of the Quran in a methodical, systematic and planned manner.

Memorizers also normally rock their bodies during recitation. They move back and forth or from side to side, especially gently or rhythmically. I was interested to know if it was a learning strategy and whether all memorizers do it. Two participants had this to say:

> Learners swing their bodies to and fro during recitation but it is just a habit. They do it unconsciously. When one recites the Quran rhythmically, one unconsciously nods one's head. The Quran has its own music and it fills you up with joy (SMP1).

> I used to rock my body a lot when I was memorizing the Quran as it helped me focus and concentrate on memorization. I think almost all memorizers do swing from side to side when they recite. This is something natural when you recite a text aloud but I don't think it helps in memorization. It is just a habit (SMP2).

Although my participants did not believe that rocking the body helped them in memorization and recall, research on kinaesthetic memory suggests that moving the body creates a pathway to learning: by moving our body, we reinforce our memory in a different way. The moving of the body alongside moving the articulators may lead to a stronger retention rate. Research (Gent 2011a; Rosowsky 2001) considers rocking of the body by memorizers as a mnemonic device. According to Kristina Nelson (1985/2001, quoted in Gent 2011 a):

> Rocking is especially characteristic of anyone reciting a memorised text. From my personal experience, it seems to be related to the memorising process (1985/ 2001, 112).

The discussion so far has revealed that although the memorizers' primary means of committing Quran to memory is phonological, they seem to make use of several pathways or modalities to keep the text in memory. For example, while sighted memorizers make a particular use of visuo-spatial information (i.e. image, colour, font size and location of the Quran text on the page) to recall the text, blind memorizers use auditory memory and one at least used some kind of imagined 'visuospatial' details, and perhaps muscle memory from experiences of walking up hills and sensory memory of walking through an orchard, to hook the sound into. In addition, all the memorizers internalized the structural and organizational make-up of the text, using it as a mnemonic hook. In chapter 4, the Quran memorizers were compared to an octopus, that is, they were considered potentially to use multiple means to hold on to the text. By using different modes and means of memorization they made sure that the text sticks in their memory over the long term. So, if the grip of one tentacle weakens or becomes loose, the other is there for the rescue. In summary, conversation with Quran memorizers confirmed that their efficient recall is a result of coding the text at multiple levels i.e. phonological/articulatory, acoustic, visual, and structural.

5.5 Motivation as a driving force behind the Quran memorization

Quran memorizers take memorization as a religious duty of great significance. The memorization of the Quran is not a chore for them. Although they start at a young age and are mostly motivated by parents (being parents of a memorizer is considered a great honour), the memorizers are keen to learn the Quran. According to two participants:

> Memorizers are motivated people and enjoy their job. They are promised great rewards in the life hereafter and there is severe punishment in afterlife for those who forget the Quran after memorization. The promise of reward is an important reason behind their memorization and constant rehearsal (SM01).

> Being parents of a memorizer is a matter of great pride and respect. Lots of people nowadays want at least one of their kids to be a memorizer of the Quran. Apart from being a religious duty of high importance, it confers a great social honour and prestige on parents. That is why when a memorizer completes memorization, it is celebrated with fanfare and both the memorizers and parents are congratulated on their success (SM04).

Another participant said:

> We are committed to keep the Quran in our hearts for the whole of our lives. It is preserved in our chests (SM03).

Although memorizers are aware of the enormity of their memorization, they are very humble about it and ascribe it to help from God. Two teachers described it as follows:

> Memorizing the Quran is a gift of God. When you want to memorize, God opens your chest for it. It is beyond human understanding. This cannot be done without God's help (BM01).

> Memorizing the Quran is a supreme way of showing your love for the word of God. The memorization of the Quran brings with it a great respect here and highest reward in the life after death (BM03).

According to participants, memorizers are quite involved and absorbed in recitation of the Quran:

> When memorizers recite the Quran they feel themselves to be in a different world and time. The Quran has an overpowering and overwhelming effect on Muslims. It touches a person's heart and mind. Sometimes it touches you so deep that you cannot help crying (SM04).

When I asked a participant if a memorizer has to know the language to feel it at that deep a level, he said:

> We know that it is from God, so God is speaking to us. Although knowledge of Arabic is important to understand the meaning of the Quran, recitation of the Quran without knowing the meaning is an act of great virtue in its own right. If you read the Quran even without understanding the meaning, there is a reward for you. The sound of the Quran affects one deeply (SM03).

5.6 What sorts of errors do the informants consider common?

I was interested to know if memorizers make mistakes while recalling the text and what kind of mistake that might be. Information on the nature of mistakes would inform us on how the

Quran has been memorized and what the memorizers can do to avoid or correct them. It would also tell us about the nature of their memory. In the words of two participants:

> Memorizers are prone to committing mistakes in recalling similar verses, occurring in different parts of the Quran or when the only difference in verses is that of a word, or a phrase. It is not always easy to remember these small details, and there is a possibility that the memorizers might get confused at those places. To guard against it, it is important to intensively rehearse such verses (SM02).

> There are verses or phrases which occur several times at different places in the Quran. Their repeated occurrence across the Quran makes it difficult to remember which verse occurs where. Memorizers need to pay special attention to such verses and need to note what comes before and after a verse that is repeated in different parts of the Quran. Sometimes parts of verses occur in different order. Such verses need to be rehearsed more often as compared to others so that they get entrenched in the mind (SM01).

It is clear from what the participants said that they sometimes have problems with sequential memory. Similar or same verses appearing in different places cause confusion, leading to errors in recall.

To see if Quran memorizers make *other* kinds of mistakes in recitation, I asked them about different types of mistakes they tend to make. For example, I asked them if memorizers confuse semantically related words, such as 'man' with 'woman', and 'morning' with 'evening', etc. They said *No* to this. According to two memorizers:

> We do not know the meaning, so there is no chance of confusing words with similar or related meanings. We are only concerned with reproducing the right word in the right order (SM01).

> It is only when one knows the meaning of the words that there is risk of confusion on the basis of meaning. For example, once during a rehearsal one of my friends who also knew Arabic got confused between two words (both meaning boat). He was actually reciting the Quranic word but the other word was also coming to his mind, so he asked me to look it up in

> the Quran to make sure he was saying the right word. He has since then rehearsed it so much that he doesn't confuse it with the other word (SM02).

This suggests that the memorizers' recall is essentially sequential or serial in nature and may be more like recalling codes or patterns such as triangle, triangle, square, circle, etc.

With regards to making phonological errors, especially errors in recalling similar-sounding words, they had a consensus on not making such errors. Here is a representative view:

> One can have problems with phonologically similar words when learning the Quran for the first time because a beginner might find it difficult to differentiate between similar-sounding or closely similar words. But a person who has learnt and already completed memorization does not have such difficulty because he has rehearsed it so often that he knows the sound of every word. An experienced memorizer might sometimes confuse phonologically similar words but that is because he is not attentive or focussed during recitation (SMP2).

The above excerpts from conversations with participants show that memorizers may be vulnerable to mistakes in sequential recall. They sometimes muddle up similar or identical verses from different parts of the Quran.

Important to this study is the finding that memorizers don't make semantic errors. According to the informants, they do not confuse or muddle up semantically related words. As the 'boat' example illustrates, if one does know the meaning, it creates the risk of semantic errors (see chapter 8). But with these memorizers, it has been proposed that they might use other hooks leading to different sorts of errors. For example, they may forget where on the page the text is, or where on their 'journey' they are. It was suggested in chapter 4 that the Quran text might not be stored in semantic LTM due to the fact that the memorizers don't know the meaning of the text. As short term memory is limited in nature and could not accommodate a long text, it was, therefore, proposed that the text might be stored in episodic LTM with hooks other than text meaning. Memorizers' views on not making mistakes along semantic lines only provide limited evidence on the Quran text being in episodic LTM. We have to wait for results of the grammaticality judgement task (chapter 7) to see if this is really the case. In chapter 4 it was also noted that information can be transferred to semantic LTM provided a semantic hook is available. Can and will the Quran memorizers transfer the text to

semantic LTM? An answer to this question will make an important part of our discussion in the final chapter.

5.7 Verbatim recall—the emphasis on super-correctness in recitation

The interviews with the informants showed that memorizers' only focus was on correct and accurate reproduction of the text. The memorizers' job is to memorize the Quran for errorless verbatim recall i.e. their input and output have to be completely identical. The importance they place on accurate pronunciation and exact recall cannot be overemphasized: memorizers have neither to add nor delete a word from the Quran text. This emphasis on exact recall explains the amount of rehearsal and repetition they engage in. In other words, they do not and cannot take risk with their memorization. It was clear from the conversation with the participants that since mispronunciation or misquoting Quran is considered a sin, memorizers need to internalize every detail of the text. The interviews revealed that memorizers attend to every word of the Quran because if they forget, there is no way to retrieve it because they do not know the language. One participant said this:

> We memorize and remember the Quran as it is written down. We rehearse it so often to make sure that we recite it correctly (SM05).

It means that memorizers do not reconstruct text from memory not only because they don't know the language but also because they are not allowed to do so. They don't and can't take the risk of reconstructing the text, because that is too dangerous and blasphemous in that one might replace or confuse a word of the Quran with a non-Quranic word (see chapter 8 for a detailed discussion on this point).

Although the Quran teachers said that knowing Arabic is helpful in the sense that it guards against committing grammatical mistakes, they insisted that they would not leave recall to their knowledge of the Arabic. According to a Quran teacher:

> The knowledge of Arabic does have an influence on memorization and recall. If I forget a word or the exact word does not come to mind, then the knowledge of meaning and/or the grammar can help in providing a word which fits in the context. I, however, won't do it

> because it is blasphemous and sinful. Therefore it is always recommended to memorize the Quran carefully and meticulously (SM04).

The Quran is memorized and recalled in a fixed order i.e. the order in which it is composed. So much is the emphasis on correct recall that during the night prayers in Ramadan (Muslims' holy month of fasting) there is almost always another memorizer (called Fatih or Sami) standing behind the Imam—the one who leads the prayers. The job of the Fatih/ Sami is to correct the Imam if he happens to make a mistake in recitation or forgets a verse. The Fatih or Sami normally recites the correct verse aloud and this alerts the Imam about the possibility of a mistake. To correct himself he either repeats the same verse or goes a few verses back and starts reciting from there. This practice shows that every precaution is taken to guard against any incorrect recall. According to two participants:

> The presence of Fatih or Sami is motivated by the fact that sometimes, in the speed and flow of recitation during prayers, a memorizer may not realize that he has skipped a verse, or has simply forgotten some verse (s). It is, therefore, important that someone should be there for a backup recall (SM02).

> When a memorizer makes a mistake in recall, he realizes it most of the time. The Quran is so rehearsed and practised that a memorizer can have an intuitive realization of a mistake he makes in recitation. Although there is always a possibility of self-correction, a memorizer may not know that he has made a mistake. The presence of a Fatih or Sami is to guard against such situations.

The above excerpts from conversations with participants indicate that the memorization is high risk in religious terms since the motivation to ensure it is reproduced accurately is very high. Plus, memorizers are duty bound to (re)produce the verses intact, so every effort is made to curtail and minimize any possibility of committing an error in recall. In chapter 4 it was suggested that the memorizers might not want ever to get the text wrong, even in rehearsal, because it will contaminate the memory for the correct version. The issue of extreme avoidance of errors will be taken up in the final chapter as it may provide a key explanation with regard to non-Arabic speaking memorizers' awareness of the morphological patterns of Classical Arabic.

5.8 Discussion

In this chapter I have examined the practices and processes involved in Quran memorization. The data just presented have shown that the memorizers in the present study had four key features to their acquisition: immediate repetition while reading, immediate repetition while not looking at the text, delayed recall, and repetition at different intervals depending on the amount of text they have memorized. Moreover, after completing memorization, the memorizers rehearse the Quran for the whole of their lives. While the first three conditions match the typical learning patterns described in the second language learning research literature, the fourth one, that is, life-long rehearsal is untypical of memorization practices discussed in literature.

What surprised me was that Quran memorizers were not involved in deep cognitive processing of the text. Their apparently long term memory of such a long text is, rather, a function of repeated rehearsal, and determination to memorize the text. One of the main themes that ran through the interviews was their devotion to, and affective association with the Quran. They are driven and motivated by a purpose and a cause: to preserve the word of God and to have the best reward in the life hereafter. Their memorization can be said to be controlled more by emotional involvement than cognition.

Conversations with non-Arabic-speaking memorizers led me ponder over the memorization practices of the native-Arabic speaking memorizers. I hadn't seen, till I interviewed the non-Arabic speaking memorizers, that I would need to talk to Arabic speakers to know about their memorization practices. To hint at an answer, I had an informal interview with three native Arabic-speaking memorizers. Conversations with them revealed that there was no fundamental difference between the two sets of memorizers (i.e. Arabic and non-Arabic speaking) in relation to memorization practices. Arabic-speaking memorizers like non-Arabic counterparts, engage in frequent and regular rehearsal at short intervals. Their reason for doing so was that they had to remember each and every word of the Quran, and if they didn't rehearse on regular basis they might not recall the text correctly. Similarly, they reported using one particular copy of the Quran for the purpose of memorization, indicating that they were using it as a mnemonic resource. This explanation notwithstanding, not engaging with the meaning when one knows a language even if partially is an interesting phenomenon.

One Arabic-speaking participant, however, said that when he recalls he feels as if he is reading from a story board. That is, because he understands the language and follows what is being said or described in there, his recall is probably based on the meaning too. This is a different perspective on memorization and recall and no other participant in this study (Arabic or non-Arabic) alluded to this aspect. As this research project deals mainly with memorization practices of non-Arabic memorizers, we cannot ascertain how far recall based on meaning as pointed out by one Arabic-speaking memorizer might be representative of Arabic memorizers as a whole.

What remains to be seen is if the intensive and extensive rehearsal of the text reported by the Quran teachers-memorizers leads to some awareness of or sensitivity to morphological features of Classical Arabic. This question will be explored in the next chapter.

Chapter 6

Formulaic language and L2 acquisition

6 Introduction

In chapter 4 the discussion focussed on the role of long term memory (LTM) in retaining and maintaining knowledge over a long period of time. Various factors, such as spaced presentation of information, retrieval of information at spaced intervals, domain-specific processing of information, and cognitive analysis of multiple features, such as phonemic, orthographic, syntactic or semantic were identified as important for a richer, distinctive and durable memory trace. It was suggested that the Quran memorizers might not only be repeating/reciting the text over and over again to remember it over the short term but also over the long term. Conversations with Quran memorizers (chapter 5) showed that the memorizers are constantly engaged in deliberate repetition to retain the Quran over the long term. Memorizers commit the text to memory in a methodical fashion to make a rich and lasting representation of it.

In this chapter we will extend the investigation to consider what the Quran memorizers' memorization practices might offer in relation to a developing sensitivity to the structure of the language. Cook's (1994) observation about memorizing in an L2 will steer the debate:

> Knowing by heart makes it possible to enjoy speech without the burden of production. It brings with it the comfort and security of the intimate situation. And as the known-by-heart is repeated many times, it may begin to make sense. Its native-like structures and vocabulary, analysed and separated out, become available for creative and original use (p. 139).

I will explore some questions that link the research literature on the role of memorization in language learning to the specific context of Quran memorization. In the course of the narrative, key findings that contribute to this picture will be highlighted. At the end of the chapter, these findings will be relisted to discuss how they interrelate and what they mean for the Quran study. The questions that will guide this chapter are:

(1) Does repetition and rehearsal of memorized sequences lead to awareness of grammatical patterns?
(2) Are there conditions under which repetition of memorized sequences results in differential language development?

These issues will be explored from the perspective of (a) the incidental or deliberate learning of multiword strings; and (b) deliberate text memorization, as an extreme form of formulaicity (see below).

At the end of this chapter, it will be possible, using the various findings assembled, to pose some questions that will take us into the empirical studies (i.e. chapter 7):

It is important to note that this study is not investigating the language production or language comprehension of the participants. I am only interested in the memorizers' receptive knowledge or sensitivity to morphological/grammatical patterns in the text they memorize and whether they can generalize their receptive knowledge beyond their memorization. The research literature reviewed in this chapter will be that which most directly relates to that issue, though it will include some reference to productive knowledge, where it contextualizes theory.

6.1 Formulaicity in language

Linguistic theory, for many decades, has been heavily tilted towards Chomskyan generative based accounts of language. One of the fundamental features of the generative account is that language is rule governed and the mental lexicon or the lexical store only holds bases and irregular items which cannot be constructed using rules (Wray 2008). Although this account remained very popular and has generated a lot of empirical research, it has faced challenges from competing theories. For example, some researchers have argued that the mental lexicon can also store units bigger than morphemes, including assemblages that are sufficiently semantically transparent and grammatically regular to be generated by rule (Sinclair 1991; Wray 2002; Ellis 2012). These multi-morphemic or multi-word strings have commonly been referred to as formulaic sequences (Wray 2002, p. 9). According to Sinclair (1991), "a language

user has available to him or her a large number of semi-preconstructed phrases that constitute single choices" (p. 110), and that they are "single choices, even though they might appear to be analysable into segments" (ibid.). Pawley and Syder (1983) reason that the native speakers of a language do not necessarily build the language from scratch. They rather have "[…] the store of familiar collocations […] expressions for a wide range of familiar concepts and speech acts, and the speaker is able to retrieve these as wholes or as automatic chains from the long term memory" (p. 192). According to Wray (2002, 2008), formulaic sequences are un(der) analysed or unanalysable multi-word or multimorphemic strings and collocations.

Over the past twenty years attention has shifted considerably to the study of formulaic language. Edited collections, such as Schmitt (2004); Corrigan et al (2009); Granger and Meunier (2008); Meunier & Granger (2008); Wood (2010, 2012); and the *Annual Review of Applied Linguistics* (2012) edited by Polio show the importance that formulaic language has attained in research on second language acquisition, representation in the mind, and use. However, the apparent consensus on formulaic language is bound up with many differences of focus and the absence of clarity on some very central issues. Although these issues pervade the research literature on formulaic language in a way that can create substantial difficulties for empirical investigations, only a subset of them are relevant to this particular study. In what follows I will discuss some of these issues.

6.1.2 Holistic storage and processing advantage

We saw in chapter 3 that working memory can hold and process only a limited amount of information over a short period of time. Miller (1956), however, showed that the online processing capacity and speed of working memory can be increased by chunking information into higher order units (cf. chapter 3). Because producing or constructing a message from scratch entails cognitive load, chaining multiword expressions that constitute a single unit affords people an opportunity to decrease pressure on working memory, freeing up processing capacity, as well as enhancing speed and fluency. Pawley and Syder (1983) propose that to compensate for limited online processing, sequences stored as whole will be retrieved from long term memory without being generated from scratch.

Research claims that the holistic storage of formulaic sequences facilitates their fast processing. Kuiper (2004, 1996; Kuiper and Tillis 1986) illustrate that 'smooth talkers' in specific settings,

such as auctions, sports commentary, and weather forecast presentations, make a great use of formulaic sequences in order to reduce the on-line processing constraints. Compared with generating sentences in real-time, speakers have a short-cut to fluently communicating a great deal of information. This processing advantage leads to communicative benefits in terms of fluency because both speakers and hearers have ready-made utterances at their service (Wray 2002, p. 18).

According to Conklin and Schmitt (2012), "[…] formulaic language is processed both more quickly and potentially differently from nonformulaic language" (p. 47). Conklin and Schmitt (2008) compared reading speed for wordstrings with both idiomatic/figurative and literal meanings (e.g., *take the bull by the horns)* and showed that the idiomatic meaning was processed faster. They interpreted this as evidence that people process the same sequence differently, depending on its sense and use.

Idioms offer the most straightforward case of formulaicity in a language: their non-literal meaning suggests that they have to be stored as fixed units independent of their constituent words and processed as wholes. Research indicates that native speakers process idioms more quickly than the novel strings. In an eye-movement study, Underwood, Schmitt, and Galpin (2004) tracked native and non-native participants' eye movement in text-reading on a computer screen. This was done to capture which word(s) the participants fixated their gaze on and for what length of time. Idioms were inserted in reading passages, and the duration and frequency of gaze fixation on the last word of idioms was examined. The control condition was non-idiom sequences. As predicted, native speakers fixated less and for a short duration on the final word in idioms than non-idioms, suggesting a processing advantage for the former. According to Underwood et al, due to the familiarity of the idiomatic material, the last word of an idiom was less fixated upon because the idiom was recognized from the initial words. There was thus less demand on the reader in terms of attention to the last word. In contrast, in non-idioms, the last word took more time and attention because the initial words did not prompt it and the participant had to take longer to recognize and process it.

According to Gibbs et al's (1989) idiom decomposition theory, idiom processing is determined by whether an idiom is decomposable (i.e. the meaning of parts map onto meaning of the whole, such as *pop the question*), or nondecomposable, (i.e. no correspondence between meaning of parts and the whole is possible*,* such as *kick the bucket*). In a semantic judgement

task (a task in which participants decide whether a string of words is meaningful or not), Gibbs et al (1989) showed that decomposable idioms (e.g. *pop the question; get the picture*) were processed more quickly than the novel control strings (e.g. *ask the question; buy the picture*). Nondecomposable strings (e. g. *kick the bucket; shoot the breeze*), on the other hand, did not show processing advantage over the novel control matches (fill the bucket; feel the breeze). They argue that the processing advantage of decomposable over nondecomposable idioms is due to the fact that constituent words contribute to the overall figurative meaning of the idiom. In the case of the nondecomposable idioms, no such relationships exist between individual words and the overall figurative meaning. Tabossi, Fanari and Wolf (2009), however, showed that native speakers of Italian were equally quicker in responding to both decomposable and nondecomposable idioms than their matched literal expressions. They concluded that idiomatic expressions, irrespective of idiom type, have an advantage over non-idiomatic or compositional expressions in terms of processing.

The above evidence in favour of holistic processing of idioms notwithstanding, idioms make just one (extreme) type of formulaic sequences. Research on idioms therefore cannot necessarily be generalised to all instances of formulaic language. In the following section we will therefore look at other types of formulaic sequences and their processing.

We have seen from study 1 (chapter 5) that the Quran memorizers do memorize the Quran in sections, and unless they later forget the sequence of learning and fuse everything into one whole, we would want to assume that the entire text is not one holistic item, but a series of smaller, though still substantial, chunks.

6.1.3 Frequency as a mark of formulaicity

The essence of formulaicity has often been attributed to frequency of occurrence (see below for a discussion on how infrequent strings can be formulaic too). In a review article Ellis (2002) asserts that formulas are frequently and regularly occurring wordstrings. He cites psycholinguistic evidence for frequency as an important measure at all levels of linguistic representation and processing. High frequency input such as *thank you, how are you?* and *nice to see you* is easily processed as compared to low frequency input.

In an auditory task in which participants monitored language input for a pre-determined target word, Sosa and MacFarlane (2002) measured reaction times of native English speakers to the function word *of* in collocations of varying levels of frequency, such as *kind of* (high frequency) and *sort of* (low frequency). According to Sosa and MacFarlane, reaction times for *of* in high frequency combinations were significantly slower than reaction times in low frequency combinations, suggesting that frequently used words become chunks and are represented as wholes.

Biber, Johansson, Leech, Conrad, and Finegan (1999) use frequency of occurrence as a defining feature and sole measure to identify lexical bundles which, according to them, are sequences of two, three or four words that co-occurred at least ten times per million, and sequences of more than four words occurring at least five times per million in a corpus. It is important to note that the parameters for a 'lexical bundle' can be set where one likes. This means that the boundaries for 'lexical bundles' are essentially arbitrary and are set according to the researcher's corpus size so as not to generate too many, or too few, examples. Lexical bundles are mostly non-idiomatic in meaning, do not constitute complete structural entities and tend to be fully compositional and systematic in the pattern of use (Biber et al 2004). Examples are: *I want to know, well that's what I, in the case of, the base of the* (ibid, p. 377).

Tremblay and Baayen (2010) explored the processing of lexical bundles (regular four-word sequences e.g. *in the middle of*) of different frequencies in the *British National Corpus*. Participants were shown blocks of six four-word strings which they were to recall as accurately as possible at the end of the block. Recall was tested by behavioural (phrase recall) and electrophysiological (ERP) means. The results showed frequency of occurrence of sequences as a reason for the improved recall. On the basis of evidence from electrophysiological measurements they concluded that "four-word sequences are retrieved in a holistic manner" (p. 170) and that "phrasal and non-phrasal four-word sequences leave memory traces in the brain" (p. 170). In another study, Tremblay, Derwing, Libben, and Westbury (2011) used a self-paced reading task and sentence recall task to compare the processing of lexical bundles, such as *in the middle of the* and matched non-lexical or control phrases, such as *in the front of the*. The string *in the middle of the,* was considered a lexical bundle because of its having a frequency of 15.3 per million in the *British National Corpus*, as opposed to a non-lexical phrase *in the front of the* having a frequency of only 0.4 per million. They found that sentences with lexical bundles (e. g., *He sat in the middle of the bullet train)* were read faster and better remembered

than sentences containing no lexical bundles *(e.g., He sat in the front of the bullet train).* Tremblay et. al. take this as an evidence of the holistic storage and retrieval of lexical bundles as a result of frequency.

So far we have seen that formulaic sequences did have an integral identity, but we now know that some formulaic sequences (e. g. lexical bundles) don't. It is therefore important to explore the relationship between frequency, integral meaning/identity, and compositionality. We will consider what each looks like on its own, and in combination with each other.

Because different formulaic sequences exhibit different properties, Wray (2012) argues that formulaic sequences may be located along various continua. For example, on a frequency continuum, lexical bundles lie on the one extreme whereas idioms lie on the other. Similarly, sequences can lie on a continuum of compositionality with novel expressions and certain idioms on the one end, and names on the other end. Wray argues that wordstrings may be frequent and noncompositional at the same time (e.g. names) and such intersection may lead to their faster processing as compared to infrequent compositional strings, that is, novel utterances.

Fast processing of formulaic sequences may be a result of another variable, i.e. salience which is the level to which something in the input can command the learner's attention. Wray (2012) reasons that "One could observe processing advantages for frequent items compared with less frequent ones if the latter are not salient, as well as for salient items that are not frequent" (p. 243). She argues that infrequent strings can also be formulaic and that there is a tension between frequency and salience. DeLosh and McDaniel (1996), comparing pure lists of high-frequency words to pure lists of low-frequency words found that lists of high-frequency items were better recalled than lists of low frequency words. On the other hand, Merritt et al (2006) found that in a mixed list of high and low frequency words, the latter were better recalled, because they attracted more attention.

The claims about the frequency of formulaic units tends to entail that they occur in a variety of situations, since that is how they can be repeatedly triggered. Since there is only one Quran, frequency in that context can only refer to memorizers' repeated encounters with the text, and to patterns of repetition within it. Perhaps some verses are more easily memorized than others because they contain words and phrases that have been encountered before. On the other hand,

this could make memorization harder because of the need to remember the correct continuation. Interviews with the Quran memorizers (cf. chapter 5) indicated that repeated occurrence of verses and phrases at different places in the Quran facilitates memorization: an earlier encounter with a verse makes it easier for processing at a later occasion in that it helps the memorizers in chunking verses as they are able to memorize more text. Simultaneously, the Quran is non-compositional for memorizers and they may have to store and retrieve text in form of chunks. The combined effect of both frequency and noncompositionality may lead to fast processing of the Quran text in terms of chunking and retrieval.

After having looked at the nature of formulaic sequences in general and some of their characteristics in particular, we will now explore the role of formulaic sequences in L2 acquisition under different learning conditions. Although this study deals with memorization in a foreign language, I will survey literature dealing with various learner populations to understand how formulaic language contributes to language learning in each case. There are two dimensions to the review: (a) type of exposure, such as classroom foreign language acquisition (FLA), and situational/naturalistic second language acquisition (SLA); (b) age, such as older and younger learners under different settings. So we need to ask: does formulaic language contribute differentially to learning outcomes in different conditions? If yes, why? If no, what could be the reasons? In the course of the narrative, some insights from the role of formulaic language in first language acquisition (L1) will also be used to see things in a broader picture.

6.2 Does formulaic language result in language acquisition?

We are interested in whether Quran memorizers develop any incidental knowledge of Classical Arabic. Why should we consider this possible? The reason is that some research has suggested that formulaic approaches to learning can indeed furnish such knowledge. Peters (1983), Nattinger and DeCarrico (1992), Weinert (1995), Bardovi-Harlig (2002) and others have argued that one of the most important functions of formulaic language is that it helps learners (both L1 and L2) acquire a language. Stevick (1989), reporting on the success stories of some language learners, revealed that some of the students he interviewed recognized a role for formulaic strategies, such as memorization and vigorous mechanical drill.

Wray (2002) reviews a number of areas of formulaic language learning such as first language acquisition, and various types of second language acquisition (i.e. child L2, adult classroom L2, and adult naturalistic L2). Wray argues that formulaic sequences contribute differently to learning a language in different learner populations. While L1 and early L2 learners appear to use formulaic sequences much to their advantage, adult classroom and naturalistic learners often seem to derive less benefit from them. Children's success in acquiring the language depends much on their using formulaic sequences as part of communication. The more a child uses L2 in communication with his/her peers, and the more social/sociable he/she is, the more are chances of his/her gaining control over the language. Successful children are not concerned with getting the grammar or the word right and they feel uninhibited in their frequent use of sequences of words that they have observed to work in achieving the desired function on different occasions. Meanwhile, in the process of communication children implicitly notice patterns and get an understanding of the constituent parts which gives them greater flexibility for expressing themselves. In contrast, classroom learners may either ignore the opportunity to work with large chunks of language, or may struggle to align the patterns in such chunks with the more atomistic, rule-based learning that they also engage in.

When it comes to adult naturalistic L2 learners, different parameters apply. Success in mastering the target language is variable, and may be because of an underreliance on formulaic (hence, internally correct) forms or on an overreliance, without success in identifying the productive sub parts that will enable flexible expression. According to Wray, reasons for their failure to progress may include their ability to bypass learning opportunities by relying on the L1, using gestures and/or avoiding linguistically difficult situations. This is in contrast to children who are socially and physically less free to find alternatives to learning, and who are more likely to align their identity with that of the L2 group. According to Wray, another reason for adult learners' failure to use formulaic sequences to learn a language is the role of literacy. Because most adult learners are already exposed to written language and thereby to the separation of individual words in their L1, they are inclined to store the words than the sequences. So instead of storing the strings and breaking them up in component parts when need be, they store the words and try to build the strings out of them. In the process, they apply interlanguage rules to recombine parts resulting in either grammatically incorrect or grammatically correct but non-native-like sentences. According to Wray, this approach to learning a language is determined by needs of the learners. While

child L2 learners may be engaged in minimum analysis initially, adult learners analyse the language from the start. This point will be followed up in section 6.2.4.

Wood (2002a) comes up with a representative view regarding the role of formulaic language in first language (L1) acquisition:

> It is interesting to note the double role of formulaic sequences as an element of child language acquisition. They are acquired and retained in and of themselves, linked to pragmatic competence and expanded as this aspect of communicative ability and awareness develops. At the same time, they are segmented and analysed, broken down, and combined as cognitive skills of analysis and synthesis grow. Both the original formulas and the pieces and rules that come from analysis are retained (p. 5).

It means that as far as children are concerned, formulaic sequences may play not only the role of facilitators in communication but also provide raw material for language learning. Peters (1983) proposes that L1 learners learn the language by segmenting wordstrings into smaller units on the basis of discovering boundaries between units. Segmentation of wordstrings benefits from (a) phonological cues such as salience of syllables, rhythm and intonation patterns; (b) frequency of occurrence of a string; (c) mapping of meaning onto the segmented part; and (d) others (hearers') recognizing, and understanding the segmented part. Similar mechanisms might be at work in successful early second language learners as discussed by Wong-Fillmore (see below). However, as mentioned above, there is a lack of agreement as to whether formulaic sequences contribute in equal measure to the development of language across various populations of learners and under different learning conditions. In the following sections that evidence is outlined and discussed for its relevance to the case of Quran memorizers.

6.2.1 The circumstances under which memorization is claimed to be easy and effective for L2 learning

In this section I will look at those circumstances which are considered favourable for L2 learning in relation to memorized text. There are studies that have come up with direct evidence in support of a relationship between formulaic utterances and emergence of L2 grammar. Hakuta (1974), for example, studied an untutored Japanese learner of English

called Uguisu from age 5.4 to 6.5. Recording of the learner's spontaneous speech with her peers in play situations were analysed. Hakuta found that Uguisu used memorized material, that is, prefabricated patterns as a language learning strategy. According to him, initially his learner learnt the pattern, *how to* as a unit in a pattern "*I know how to* +verb. With the passage of time, she gradually segmented and extended the pattern to other verbs e.g. *show, tell, be* showing that she was doing some analysis of the structure. This, according to Hakuta, "suggests a strategy of learning on the surface structure level: learning through rote memorization of segments of speech without knowledge of the internal structure of those speech segments" (p. 287). Uguisu manifested "the knowledge as to which particular situations call for what patterns" (p. 288), showing that she had mapped the multi-morphemic strings onto a pragmatic/semantic function. Hakuta concludes that the store of memorized material, even when it is not understood at the time of acquisition and is well beyond the grammatical knowledge of the learner, provides him/her with a resource to analyse the language and learn the underlying grammar. Myles et al (1998) also found similar results in early teenage learners in the classroom setting (see below, section 6.2.4).

Wong-Fillmore (1976), in a longitudinal study, investigated the role of formulas in the language of five Spanish-speaking children of 5 to 7 years old, acquiring English in an American kindergarten and school. These children were in a natural acquisition condition without having any formal tuition. According to Wong Fillmore, the most successful of her learners, Nora, achieved native-like competency within a span of nine months. Her use of memorized sequences propelled her into sounding like a native speaker of English very quickly. Wong Fillmore attributed Nora's successful acquisition to her combining the processing and interactional roles of formulaic language: she was using a large number of memorized sequences as her interactional strategy and was engaged in segmenting them to identify grammatical characteristics from early on. Wong-Fillmore argued that all her participants used formulas as an acquisitional strategy by releasing and freeing up recurring parts to be available for generative use outside the original formulas. She concludes:

> What the learner derives from the analysis of formulas already in his own speech repertory are grammatical rules, and these rules, which form the bases for productive speech, gradually free him from his early dependence on formulaic speech (p. 300).

According to Wong-Fillmore, her learners put these sequences to analysis by noticing variation in the utterance structure and similarities in parts of formulas according to the situation. The sequences once analysed were not discarded however, and were used alongside the now available smaller units as a result of the analysis.

The above account has shed some light on a developmental relationship between formulaic sequences and a generative/creative capacity of early L2 learners (children) in naturalistic environment. Hakuta's and Wong Fillmore's studies have indicated that children who are engaged in naturalistic L2 acquisition mirror what Peters (1983) found in L1 acquisition: they used formulaic language as raw input for analysis, gradually making their way into the language system. This accords with Hopper's (1987) view that "grammar is what results when formulas are re-arranged, or dismantled and re-assembled, in different ways" (p. 145).

Hakuta's and Wong Fillmore's position with regard to a link between memorized sequences and emergence of L2 grammar is not uncontested. Krashen and Scarcella (1978) are among those researchers who have been sceptical of the role of formulas in contributing towards the development of the language system in both child and adult L2 learners. In a review article, Krashen and Scarcella (1978) discuss the role of a specific kind of formulaic language i.e. routines and patterns in child first language acquisition, and child and adult second language acquisition. According to them, "prefabricated routines are simply memorized whole utterances or phrases, such as 'How are you?' or 'Where is your hotel?' (p. 283). A learner may use them without knowledge of their internal make-up. Patterns, on the other hand, "are partly creative and partly memorized wholes and consist of sentence frames with an open 'slot' for a word or a phrase, such as 'That's a—(pen, knife, banana)'(p. 283). Krashen and Scarcella reason that in L2 learning, routines and patterns do not contribute to the grammatical development of a learner as 'analytic' language develops independently of the formulaic or automatic speech.

Using Peters' (1977) terms for describing L1 acquisition strategies, Krashen and Scarcella argue that the same strategies are at work in L2 acquisition as well. An 'analytic' strategy whereby a learner acquires individual words for naming and labelling, and a 'gestalt' strategy whereby long utterances are acquired "for early production before sufficient competency has been built up" (p. 298). According to them:

> The two modes are independent and the analytic mode eventually predominates, with gestalt speech primarily serving only as a short-cut, a pragmatic tool to allow social interaction with a minimum of linguistic competence [sic] (p. 290).

They further reason that a language is not generally acquired in the situations described by Hakuta and Wong Fillmore. According to them, in everyday situation language input is not as predictable as in these studies (p. 295). They conclude:

> [It] shows clearly that under certain conditions the "gestalt" mode may be encouraged to a remarkable degree. It does not demonstrate that all language is acquired this way by all acquirers or even that the analytic style may be totally circumvented (p. 295).

Although Krashen and Scarcella do not see a role for formulaic speech in language learning, they do admit that 'certain conditions' do allow for that.

At the centre of language learning in Hakuta and Wong Fillmore's studies is the use of formulaic sequences as an interactional strategy. It is, therefore, relevant to ask if segmenting and analysing memorized sequences into constituent units might be a corollary of using formulaic language in natural conversation. If it is a natural corollary of interactional use, then is interactional use also a necessary condition? For example, if there are 5-7 year olds learning the Quran, will the differences between their learning and Hakuta's, and Wong Fillmore's learners be enough to change what is developed in terms of grammatical and lexical knowledge? This will be followed up in the discussion section of this chapter.

Having looked at the role of memorized strings in naturalistic conditions, we will now explore the role of memorization in classroom settings, as one step closer to the Quran context, in that it's not primarily interactional.

A circumstance where memorization has been shown to be particularly conducive to L2 learning is the deliberate memorization in Chinese schools. Literature on the Chinese school practices suggests that memorization is an established language learning strategy. Ding (2007) interviewed Chinese college students, who were winners of nation-wide annual English-speaking debate competition, about their English-learning strategies over the course

of their school time. According to Ding, they were not only required to learn several pages of lesson/texts by heart, but were also made to imitate and recite after a native speaker's recording on a cassette, following the exact intonation patterns of the speaker. Ding, however, noted that their memorization was not necessarily based on the understanding of the text: they memorized and stored stretches of language in absence of comprehension of the internal make-up of the text.

Ding suggests that in real-time communication, his learners benefited from the off-line memorization because it had provided them with opportunities to notice and attend to form, neither of which was possible under the pressure of real time interaction. Deliberate rehearsal of the linguistic forms enhanced their understanding of the language without necessarily understanding the contents. The learners ascribed their learning of English to recitation and memorization of text and believed that

> [they had learnt] many collocations and sequences, especially the function words, inflectors and other minute features of language that are contained in these collocations and sequences but tend to be ignored by learners when they engage in listening and reading (pp. 276-77).

Ding's study highlights the value of memorization in that it gives a learner ready-made expressions for production, so that he/she develops knowledge of how the words should go together without actually learning a rule for how to assemble them. According to models of emergent grammar (Hopper 1987; Ellis 2002), frequency is important to learning. Memorization increases the frequency of exposure to a pattern, resulting in learning. This mirrors Quran learning, so long as the instances that frequently occur are *identical.* This is in contrast to learning language by rules where learners can make mistakes due to insufficient knowledge of the target language grammar (see later section 6.2.3). This is an important claim in the context of Quran memorization as it puts us in a position to ask: can memorization of the Quran lead to sensitivity towards an understanding of language patterns of Classical Arabic in the same way as the Chinese learners of English described by Ding? It is important to note that these Chinese learners in Ding's study were also getting language instruction and doing all the other L2 learning things such as vocabulary, grammar, tests, etc. Memorization was just one additional tool. So, what would the Quran memorizers need to do to mimic this? An answer to this will be provided in the discussion section at the end of this chapter.

Dai and Ding (2010) provided further support in relation to the role of memorization in making a learner consciously notice and attend to language forms, helping in acquisition. They investigated the role of text memorization in the English writing of Chinese undergraduate students of a military academy. Learners studied English for three months, taking courses on reading, oral English, and listening comprehension. The amount of time spent on learning English was controlled as all students attended the same classes at an appointed time. Outside the class hours, they studied and prepared for classes and exams for a fixed number of hours. Plus, they all studied the same books and were taught by the same teacher.

An experimental group of students were asked to memorize text containing different formulaic sequences (FSs). They were to recite the text in class the next day. The experimental group was tested against a control group who were not required to do any memorization and recitation in class. To explore how different learners approached text memorization and what their practices were, the experimental group was further divided into high and low achievers on the basis of their English scores in matriculation examinations and scores obtained in reading course for the three semesters in the academy. Data were elicited by means of pre-and post-tests of proficiency, such as reading comprehension, paraphrasing, cloze test, writing an essay on a given topic, and interviews on their memorization practices.

The results showed that the experimental group outperformed the control group in terms of frequency, accuracy and variation of formulaic sequences. Within the experimental group, on the other hand, low achievers benefited more in terms of frequency and variation of formulaic sequences while high achievers benefited more in terms of accuracy. According to Dai and Ding: “Through text memorization, low achievers learn to use more FSs in a broader range of variety while high achievers learn to use them more accurately” (p. 84). Dai and Ding note that high achievers were used to memorization from their high school time and would memorize a text without being asked by the teacher when it “contained beautiful words” (p. 83). The two groups of learners thus differed “in the focus of their attention when they were memorizing the text materials” (ibid). High achievers’ superior performance with regard to accuracy of formulaic sequences was attributed to their focus on “the linguistic and textual context of FSs” (p. 83). In contrast, the low achievers focussed more on learning new formulaic sequences, “resulting in progress in the frequency and variation of their FS use. At the same time, the use of newly learned FSs may have affected the accuracy” (p. 83). Dai and

Ding concluded that "text memorization helped foster in the learners a habit of attending to language while engaged in reading or listening" (ibid). Given that the Quran memorizers are also involved in extensive repetition of the text over a long period of time, will their memorization cultivate in them a habit of focussing on text detail? This point will be followed up at the end of this chapter.

The above account has focused on the positive impact of repetition on language learning under natural interaction by child L2 learners, and Chinese classroom language learners. What remains to be seen is the role of repetition in language learning under experimental (i.e. laboratory) conditions.

Ellis and Sinclair (1996) investigated the effect of phonological rehearsal/repetition of novel foreign language utterances on language acquisition. Adult non-Welsh speaking participants learnt English translations of 30 Welsh utterances randomly played by a computer. The utterances included 10 single words (5 pairs of nouns beginning with the letters *t*, *c*, *d*, *p*, and *m*), 10 uses of these words in a phrasal construct incorporating "*ble ma e*_____" ["where is_____''], and 10 usages of these words in a phrasal construct `"*ei*_ ____*o*" ["his_____"]. Importantly, the construct "*ei*_____*o*" involves the use of grammatical rule, the Welsh soft mutation, which causes certain initial phonemes of nouns to change sound. This means that the learners encountered the target words in two different forms: mutated and unmutated, in different grammatical contexts.

There were three conditions of learning: (a) in a silent condition participants remained silent while they had to type in the English translation for the Welsh utterences; (b) in a repetition condition participants were required to repeat the Welsh utterences aloud as played by the computer while they were typing in the translation; (c) in an articulatory suppression condition participants' articulation of the utterances was disrupted as they were required to continuously whisper one to five while listening to the Welsh utterance and typing in the translation.

Participants' performance was judged with respect to (a) the well-formedness of Welsh utterances. They were played 40 Welsh utterances some of which had mutation errors in, and were asked to make judgement with regard to the utterance being right or wrong as quickly as possible. Participants were not given any feedback on their answers; (b) metalinguistic

awareness of the rule structure underlying Welsh soft mutation. Participants were played the phrasal construct and the initial sound of a Welsh noun, and they had to type in the unmutated sound of the noun. As the learners had not been given any feedback, they didn't have any formal knoweldge of these rules; (c) oral production of the Welsh utterances. Participants heard the English translation and had to produce the Welsh equivalent which they had heard earlier.

Results showed that phonological rehearsal of L2 utterences was more conducive to different aspects of L2 learning than both silent and articulatory suppression conditions. Rehearsal led to superior comprehension and translation of foreign language (i.e Welsh) utterances, explicit understanding of the rule system of the Welsh mutation, acquisition of foreign language forms and accuracy in pronunciation, and grammatical accuracy in correctly mutating or not mutating the form. Ellis and Sinclair, however, reason that it is not clear whether the advantage of the rehearsal in repetition condition occurs at input or output. According to them:

> The repetition effect may arise from the subjects' articulating the FL utterances (output), from their hearing their own repetitions (and thus getting twice the input of the [articulatory suppression] group), or from a combination of the two (p. 243).

Irrespective of whether the effect of repetition results more from the output or the input or is the cumulative result of both, Ellis and Sinclair regard repetition as a mechanism behind learning a foreign language, both its vocabulary and the grammar:

> […] repetition of FL forms promotes long-term retention. We assume that as learners practise hearing and producing FL words, so they automatically and implicitly acquire knowledge of the statistical frequencies and sequential probabilities of the phonotactics of the FL. In turn, as they begin to abstract knowledge of FL regularities, they become more proficient at short-term repetition of novel FL words. And so FL vocabulary learning lifts itself up by its bootstraps (p. 244).

According to Ellis and Sinclair, as learners rehearse more and more, they become able to see and notice regularities and patterns in word sequences. The more learners repeat, the more they abstract knowledge about associations among morphemes and words.

Emphasizing the role of repetition in language processing and learning, Hummel and French (2010) argue:

> The better the ability to rapidly process, retain, and repeat new phonological material, the better equipped the learner is to process the new pattern in a language being learned. Techniques that ultimately allow individuals to optimize their PM [phonological memory] processing speed or overall capacity could be expected to free resources that could then be devoted to processing other aspects of the input, such as syntactic patterns and semantic content. More efficient processing could allow learners to pay closer attention to formal aspects of linguistic input at the same time that they are using the target language to understand and convey messages (pp. 381-82).

The claim made by Hummel and French is very important because it suggests that repetition can enable learners to pay attention to formal aspects of language even when they have not been asked to pay attention to them. Moreover, Hummel and French reason that reading aloud is a useful strategic tool to enhance the function of phonological memory. According to them, although reading aloud is considered to reduce access to meaning, it activates the phonological loop through rehearsal and repetition and may transfer information to the LTM. Phonological rehearsal also leads to automatization of fluency skills. Ellis (1996) asserts that to "[say] words aloud [leads] to faster learning with better retention than silent rote repetition of vocabulary lists" (p. 104). According to him, articulation in some form along with repeated practice is a prerequisite for memorizing speech material.

The key thing in the above studies, however, is that learners' experience with the text was different from that of the Quran memorizers'. Ellis and Sinclair's study, for example, entailed reading translations which the Quran memorizers don't do: they don't know the meaning of the Quran text and hence it is incomprehensible to them. Hummel and French are talking about real exposure and suggest that noticing of patterns happens when one is trying to extract meaning and build knowledge. Again, Quran memorizers don't engage with the text at a semantic level. It means that comprehensibility of the input is a vital requirement for learning a language. Some researchers, including Krashen (1981, 1985), have claimed that

one cannot acquire a language only through exposure because one needs to understand it. That is, learning can happen only when input (i) is comprehensible, but a bit more difficult than what learners understand i.e., (i+1).

The above account suggests that Quran memorizers might recognise collocational sequences but that they won't have any grammar because they need some meaning in order to parse and recombine the parts for a meaningful purpose. This marks a pre-grammar stage as far as sensitivity to pattern recognition is concerned. In the context of the present study, it is appropriate to ask if the Quran memorizers, on the basis of constant repetition and rehearsal, will be able to direct their free attentional resources at noticing and processing of colloctional patterns of Classical Arabic. In other words, will the Quran memorizers, in the absence of any language learning goal and without the intention to understand the language, still be able to notice formal properties of the language just because they engage in constant repetition? This question will be followed up in the discussion section of this chapter.

6.2.2 Noticing of form—an important pre-condition for language acquisition

The evidence so far has suggested that repetition of form does lead to noticing which in turn might result in its learning. However, some important questions do arise at this point: How and why should memorization result in noticing? Is noticing form an important pre-condition for its acquisition? The ensuing account will seek answers to these questions.

Research on second language acquisition (SLA) has put great emphasis on noticing as an important pre-requisite for acquisition of language forms. Certain researchers, particularly Richard Schmidt (1983, 1990; Frota & Schmidt 1986), have argued that the role of conscious noticing is an essential requirement and a starting point for learning language forms. Schmidt (1990), for example, reasons that voluntary or involuntary noticing is a crucial and necessary condition in acquiring a form and is a function, among other things, of frequency and salience of input. According to him, frequency and perceptual salience are intrinsic to the input: they are qualities of the form itself and serve the role of highlighting the form by keeping focus on it. Frequency, that is, the repeated occurrence or presentation of a form provides an opportunity for it to be noticed more often than a less frequent one. Perceptual salience, on

the other hand, refers to the prominence of the form in input and contributes to its noticeability.

In a study based on Schmidt's own experience of learning Portuguese in a classroom setting, Schmidt and Frota (1986) found that although certain features were frequent and were part of input for a long time, they became part of his language system only when they had been noticed, either because those features were brought to his attention in the classroom, or because he had noticed people saying them. Schmidt and Frota also found that despite being corrected by native speakers in his conversations with them, he was not able to produce the correct form because he was not aware of being corrected.

Despite what some research suggests about the role of frequency and salience of form in noticing, there seems to be a tension between them. Gass and Selinker (2001) have made the point well:

> Something which is very *frequent* in the input is likely to be noticed. On the other hand, particularly at more advanced stages of learning, stages at which expectations of language data are well-established, something that is unusual because of its *infrequency* may stand out for a learner (p. 402, emphasis in original).

The above account underscores the importance of salience as a necessary variable in learning a form, be it the result of frequency as argued by Ellis, or infrequency as proposed by Wray (see section 6.1.3 above), and Gass and Selinker. In other words, learners may not be able to notice and learn a form if it is not salient, and hence not noticeable. Will the frequent repetition of the Quran text by memorizers result in their noticing and learning the form? Chapter 7 will give us an answer to this question.

6.2.3 How reliably memorized material is reproduced

The account so far has indicated that under certain circumstances memorization facilitates L2 learning. In this regard the role of both off-line (Ding 2007; Dai and Ding 2010) and online (Ellis and Sinclair 1996) repetition and rehearsal seems able to make the learner focus on linguistic details, leading to the acquisition. It was also noted that memorization provides a

learner with a repertoire of authentic exemplars, bypassing the need to learn the rules to build a sentence from scratch. According to Wray (2004):

> The key advantage of memorizing linguistic material is that you do not have to know *why* it has the form it has. You just need to remember it. You don't need to make any choices, only use what you have learned (p. 262).

This apparent advantage of memorization notwithstanding, reproducing memorized material correctly is not all that simple. Memorizing a text is one thing, reproducing it reliably and using it correctly is quite another. In this section I will explore some of the research dealing with how reliably memorized text is reproduced and what it might mean for language learning and Quran memorization.

Ding (2007, see above) found a high level of accuracy in reproducing the memorized material. According to him, memorization practices at school inculcated in his learners a rigorous habit of rote-learning for strict verbatim recall with particular focus on prosodic and intonational features. The learners were so tuned in to memorization and imitation that they would watch English movies and would listen to English songs, mainly to recite and imitate lines from them, which they would then use in conversation for fluency. According to Ding, "when they speak English, lines from movies often naturally pop out, making others think of their English as natural and fluent" (p. 275). In words of one of Ding's informants: "what had been memorized became our own language" (ibid). However, it is important to note that people may memorize and correctly reproduce text without understanding if correct reproduction is rewarded on tests. While a person can be proficient in his/her use of language and can correctly reproduce what he/she has memorized, accuracy in reproducing pre-memorized material can be a signal of lack of knowledge too (Wray and Pegg 2009).

Wray and Pegg (2009) investigated the impact of memorization on IELTS Academic Writing Task 2 exam performance. Scripts written by Chinese speakers with various band scores and from different IELTS test centres around the world were analysed. Wray and Pegg showed that the test takers with limited productive proficiency could in some cases get a really high score in an IELTS exam by using pre-memorized wordstrings, even though the topic of the essay wasn't known in advance. They propose that in order to unravel the real learning and proficiency of a learner, the IELTS examiner needs to have a means of identifying wordstrings that have been memorized without a full command of their internal composition.

They also suggest that the IELTS marking system needs to be able to avoid rewarding accurate output that is so-generated. However, given that L1 speakers might also use prefabricated wordstrings when composing written work, not rewarding apposite, nativelike output by L2 speakers even if it is believed to have been memorized, is paradoxical.

The above account suggests that just as accuracy indicates lack of knowledge, so inaccuracy can indicate that there *is* knowledge. Memorized material is not necessarily correctly reproduced as learners and users, for a variety of reasons, may introduce errors in and deviate from what they have memorized. Wray and Fitzpatrick's (2008) study offers an interesting perspective on deviations from memorized material. Their participants were non-native English speakers (Chinese and Japanese) of intermediate and advanced proficiency who memorized and practised native-like sentences for reproduction in pre-identified real life situations. Participants' performance was analysed by deviations/changes (native- and non-native-like) they made from the model utterances. Deviations were categorized at morphological, lexical, and phrasal levels. While native-like deviations were recognized as normal and indicative of native-like behaviour, non-native-like deviations were considered as mistakes.
The premise was that if someone knew what they wanted to say and had practised saying it, they should be able to just produce it perfectly. Wray and Fitzpatrick's participants, however, couldn't. Furthermore, the results indicated that the most proficient participants were not ones who performed best in reproducing the perfect recall.

Wray and Fitzpatrick interpret these results in light of what they call risk-taking which, according to them, "[consists] in not attending to the fine detail during memorization" (p. 142). Wray and Fitzpatrick reason that the proficient participants, on the basis of their receptive knowledge of the language, felt able to take risks in not fully attending to all the details of the materials, raising the chances of errors in recall.

Elaborating on the notion of risk-taking in memorization, Wray (2008) argues that faithful reproduction is a function of the amount of attention given to internalizing the linguistic details. Attention to form, in turn, can be a function of the extent of knowledge one thinks one has of a language. Learners may take risks by not giving the required attention to form in memorization in a calculated fashion, and the risk-taking depends on how much they know of the language (p. 254). Risk-taking might be a strategy used by a learner to lessen the

cognitive load of verbatim memorization. Wray claims that L2 learners, like native-speakers, attend to linguistic form on the basis of their 'knowledge' of the language. If a learner thinks himself/herself linguistically competent enough to restore an item should he/she forget it, he/she may not pay enough attention to internalizing it, and may instead depend on his/hers generic language skills to provide it. However, his/her lack of native-like vocabulary and syntactic knowledge will cause non-native deviations or errors.

The above account suggests that one can take risks with memorization when one knows the language to a certain level, and the more one knows the language the more one will feel tempted to take risks by not paying full attention to the details. Highly competent speakers can risk not memorizing fine details such as morphology, because they can reproduce them from their knowledge base. In contrast, someone who has little or no command of the language cannot rely on taking such risks, and must, instead, put extra time and effort into memorization. It follows that if one does not know the language *at all*, no risks dare be taken. In the context of the Quran memorization we can see that one way to measure the learners' internalisation of the patterns might be to find out whether they deviate from the target form. If they have *no* knowledge, they are obliged to commit every bit of the Quran text to memory because if they happen to forget a word, they may not be able to reinstate it. If, in the course of such memorization, they do internalize patterns, then they might be at increasing risk of introducing errors. If familiarity with patterns does increase the risk of deviations, then we can ask whether memorizers who know Classical Arabic are more at risk of making errors than those who don't. If they are, how do they avoid incorrect recall? One answer to this question comes from the interviews with the Quran memorizers described in chapter 5. According to the participants, almost all memorizers, whether they know the language or not, memorize every single word of the Quran text. As accurate recall is the most important requirement in their memorization, they engage in frequent rehearsal in order to make sure to not make an error of commission or omission. Those memorizers who know the language do not let their knowledge of the language interfere with their recall. In the final chapter we will return to this extreme emphasis on correct recall as a key for understanding Quran memorizers' capacity for learning the language.

As mentioned above, Wray (2008) considers risk-taking to be an index of proficiency (p. 255). A learner takes risk on his memorization on the basis of receptive knowledge of a

language which he may overestimate or confuse with his productive knowledge. The more a person takes risks, the more they may commit errors, if they have overestimated what they can reproduce. She suggests that this mismatch between receptive and productive knowledge may result in an impasse in learning. Learners are puzzled about why they keep making the mistake, since they know the form. The converse is also true. Making errors in this sense can be an indication of progress (e.g., due to overgeneralization), and can be explained in terms of learners' attempts to discover the system and structure of the language. According to Corder (1967):

> [Errors] provide to the researcher evidence of how language is learned or acquired, what strategies or procedures the learner, is employing in his discovery of the language. […Most importantly however] they are indispensable to the learner himself, because we can regard the making of errors as a device the learner uses in order to learn (p. 167).

This suggests that making errors can be very revealing in terms of learning the language. I will take up this issue in the final chapter in relation to the Quran memorizers' learning or not learning the language patterns.

Wray (2004) reports an extreme language learning situation in which a Welsh beginner speaker, Margaret, with very little previous knowledge of the language was to present a cookery demonstration to a live audience on a television programme. For this, she had to learn the necessary language over an intensive learning period of four days. The language required for performing the task was introduced to her in three tutorials and she had to memorize and practise whole phrases and sentences provided to her by the tutor, to be fully prepared for the cookery demonstration. Given the very short period of time she had to prepare herself for the performance, she was not taught much vocabulary, nor were grammatical rules explained in detail, though she was given examples of patterns with minimal description of what was happening. Since she was to deliver in a language well beyond her abilities, she had to rely heavily on memorized material.

As noted earlier (see section 6.2.1), a characteristic of the Welsh language is the front mutation of words, that is, a change is made to the beginning of a word, on the basis of a phonological property of the preceding word or of the grammatical context. Margaret's script

contained (a) mutations that were explicitly taught to her. For example, the tutor showed her the soft mutation of certain words after the phrase *I am going to*; (b) the mutated forms were not specifically taught but they were noticeable because their unmutated form had been encountered in the tutorials. Margaret's script, therefore, contained both mutated and unmutated forms; (c) mutated forms with no mention of their being mutated. So, Margaret did not know if they were mutated (p. 263).

According to the results, Margaret used the correct mutated form where she had not encountered any other option. On the other hand, she erroneously used the incorrect base form for the correct mutated form where she had a choice of forms and didn't know which one to use.

Margaret's recall performance indicates that there is always a risk of getting the recall wrong if different choices are available to an individual, no matter how motivated he/she is to recall it accurately. This is a very important claim in relation to the present study. Although Quran memorizers like Margaret memorize for verbatim recall, unlike her, they succeed in (re)producing the text verbatim without errors. The questions that pertain to the issue are: if both Margaret and the Quran memorizers memorize for recall without errors, what is it that causes errors in the recall of the former but not in that of the latter? Why do potential choices of form inherent in the text not trip the Quran memorizers up as they tripped Margaret up in Wray's study? What might the Quran memorizers do to avoid the risk of putting themselves into a difficult and rather dangerous situation of mistaking one form for another? One answer to this would be the excessive rehearsal of the Quran text to the point that the memorizers are thoroughly familiar with and remember each and every occurrence of the form in different verses. Interviews with the Quran memorizers confirmed that memorizers are engaged in learning the text by drilling as they rehearse each and every verse multiple times, suggesting that the memorizers were aware of presence of a form in different verses. I will return to this in the final chapter in relation to risk-taking in memorization.

6.2.4 Memorization as a strategy to release the constituent parts and reuse them

Research indicates that language learning takes place when constituent parts in input are released for creative use. In this section evidence from language classrooms will be discussed to

see how this might happen. Ellis, R. (1984), for example, reports a study of one Portuguese (age 11) and two Pakistani (ages 11 and 13) secondary school children in an English learning classroom. Utterances produced during the first year of their school were analysed. Ellis notes that the three learners variously segmented formulaic utterances into constituent parts for re-combining them. Tracing the development of "I don't know", Ellis noted that the three learners added new material to the formula either formulaically as they had picked it up "from the teacher's previous utterance, attaching it as a single, unanalysed unit to an existing routine" (p. 62) or by deriving it through rules. Although Ellis is cautious about the "real analysis" (p. 63) by his learners to derive rules from memorized chunks and to use various components productively, his learners did manipulate to add and rearrange parts of the memorized utterances.

In a longitudinal study spanning two years, Myles et al (1998) investigated the contribution of formulaic sequences i.e. rote-learned utterances in school children's development of creative use of language. A group of sixteen English-speaking children, from the age of 11 to 13, learning French as a foreign language in two British schools were examined. Data were gathered in fortnightly classroom observations, by involving participants in paired tasks with either a participant or a researcher, and by interviewing them at the end of the term. Three unanalysed chunks, that is, *j'aime* (I like), *j'adore* (I love) and *j'habite* (I live) were selected and tracked.

The results revealed three different patterns. (a) One group of learners (31.5% of the participants) broke down the chunks and used the pronoun with verbs outside the chunks in a target like way; (b) another group (37.5% of the participants) showed mixed results of separating the components of the chunk; (c) and another group (31.5% of the participants) could not use the subject and verb outside the chunk, showing that they had not internalized the rules to produce target-like sentences.

According to Myles et al, in the early stages of learning, formulaic sequences were used as a means of communication but as the learners' communicative needs outstripped the current formulas, they had to analyse the existing formula to suit their needs. That is, when learners realised that they needed to refer to the third person, they deconstructed the chunk to productively use the pronoun-verb combination. For example, the third person singular

pronouns *il* (masculine singular) and *elle* (feminine singular) were productively used with a verb because the first or second person pronouns in the formula were not sufficient for them anymore. The formulas had been introduced for the exchange of personal information with little involvement of the third person, e g., *où habites-tu?* (Where do you live?), *j'habite à* (I live in…) (p. 359). To suit the learners' arising communicational needs, the existing formulas were modified and adjusted, e.g., *j'ai .. no oh .. elle habite le* (town) (I have .. no oh .. she lives in [town] (p. 351). Similarly, *j' adore* was replaced by *il adore* in the following sentence: *Richard est j'adore le ping-pong (..) ah oui il adore la muse* (Richard is I love table-tennis [..] ah yes he loves museums) (p. 358). The important point is not that 'il adore' was said second, but that the chunk 'j'adore' was said first, meaning that it wasn't 'adore' but 'j'adore' which they had internalized as a chunk. According to Myles et al:

> What triggered the breakdown process ...was the pupils' realisation - whether subconscious or not - that the well-practised classroom routines with which they were familiar proved inadequate when talking about third parties (pp. 357-8).

This means that the segmentation was driven by interactional need. The shift from one to the other formula, however, took place as they spoke, not between instances of use. So they first said what they knew, realised it was wrong, and changed it.

. It is difficult to say whether the segmentation of a formula into smaller units was a product of the learners' natural developmental progression as a result of their communicational needs, or Although Myles et al's study does give some evidence of the segmentation process of formulas into lexico-grammatical components to be used in combination with other parts, the role of classroom instruction complicates the issue and rather weakens the evidencea consequence of teaching of words and grammar in the classroom. Notwithstanding the teachers' comments that they didn't teach the children any grammar (Mitchell and Martin 1997), it is inconceivable that they had not taught 'il + verb' and probably 'il + adore' and 'il + habite' in particular.

Research on L1 also suggests that learning happens by segmenting longer strings into smaller units (see section 6.2). According to Wood (2002b), in L1 the process of breaking down of formulaic sequences into constituent parts starts to happen with the advent of complexity of thought:

> As thought gets more differentiated, then, there is a less need for the formulaic sequences themselves, but for their composite parts, which are more subtle and complex parts of language. As more complex thoughts need expression, a reliance on formulaic sequences is inadequate, and more flexibility of language is required (p. 38).

The above account suggests that memorized strings do provide language learners with necessary input to kick-start the learning process. This process, however, seems to be dependent on interactional use. That is, interaction drives or necessitates first the release and then the reuse of component parts in new contexts. So learners might segment input into parts when there is a need for them to do so. Wray's (2002) model of Needs Only Analysis (NOA) explains this situation well.

> The process of analysis which the child engages in would not be that of breaking down as much linguistic material as possible into its smallest components. Rather, nothing would be broken down unless there was a specific reason (Wray 2002, p. 130).

According to Wray, Needs Only Analysis is a learning strategy which determines the contents of the mental lexicon. One of the most important things that Wray claims is that need, in determining analysis, is not just a way to increase analysis but also to prevent it. If you don't *need* to break something down because there's no reason to, then you won't. This point will be returned to in the final chapter.

6.2.5 Memorization for the sake of memorization versus instructed learning

The above section has highlighted that L2 classroom learners gradually deconstruct the memorized input in order to construct new utterances. However, as was noted earlier, it is not clear whether it is the memorized strings that kick-start learning or whether the instructions provided by the teachers help the learners see patterns in the memorized input. To eliminate the effect of instructions on learning of form, it is, therefore, worthwhile to see whether untutored and uninstructed learning leads to some kind of grammatical development.

Tode (2003) tested over 100 Japanese learners of English in each of two years (grades 8 and 9) to see whether the latter, having had an additional leave of exposure to the *be*-copular (used in the textbook but never explained) would have resulted in greater awareness of the underlying

rule. Data gathered through a written elicitation test showed no significant difference in the knowledge of the two groups and that less than half the participants had internalized the rule successfully. According to Tode, mere exposure to linguistic input is not sufficient to induce appropriate rule for classroom learners and explicit teaching of such rules is necessary for grammatical learning.

Yu (2013) examined the ability of 104 Chinese University students' to extract the rule for *despite +NP*. Participants were assigned to three experimental groups, viz., (a) memorization group1 (MG1), (b) memorization group2 (MG2), and (c) the instruction group. The instruction group received direct instruction on the rule governing *despite +NP* during routine class teaching. They were told in English and Chinese that "the word 'despite', [unlike] 'although', is a preposition which needs to be postmodified by a noun phrase rather than a sentence" (p. 102). Examples in oral and written form were also provided. The two memorization groups were not given any instruction on the rule and were only asked to memorize a paragraph containing two examples of the target structure *despite the fact that*. The two memorization groups, however, differed in the kind of paragraphs they memorized: memorization group1 was given a paragraph with simpler exemplars, that is, exemplars that were simple "either in the sense of the length of the sentence or grammatical elements involved" and which were "likely to help the learners ease the burden of extracting the target rule" (p. 106). Following are the two target occurrences: *Despite her worries, Oprah loved Chicago* […]. *At the same time, she was often scared that the show would fail despite the fact that Oprah was good at her job.* Memorization group2 was given a paragraph that contained difficult exemplars, that is, "the original sentence containing the target structure is far too complicated or confusing linguistically for the learners to generalise the imbedded rule" (p. 101). Examples are: *Despite the fact that my friend warned me against being taken in, despite everything I've learned, I find that I'm not willing, but positively eager to buy that bridge she mentioned.*

Data were collected through (i) translation test, that is, learners were asked to translate a sentence from Chinese to English using *despite*; (ii) multiple-choice test in which learners were to choose the correct answer from four different realizations of the structure *despite + NP,* with two correct and two incorrect answers.

According to the results, the instruction group performed well on both translation and multiple-choice tests, showing that learning of the rule had taken place. Memorization group1, the one

with simpler sentences, learnt more and performed better than group2 with difficult sentences. According to Yu, "The […] rules realised in simpler linguistic context [sic] might be easier for induction" (p. 105). Yu invokes DeKeyser's (1995, 2000) assertion, according to which, for adult learners to deduce rules from memorized chunks under explicit instructions, two conditions must be met i.e. (a) easy rules; (b) high aptitude learners (p. 105). By easy rules he means that the link from exemplars to the rules or the linguistic context in which the rule is realized needs to be clear and easy. It is important to note that the rules were the same in all three conditions, that is, *despite* is followed by a noun phrase (NP), so the lesser learning of the second memorization group was not because the rules were harder. Interviews with learners from all three groups also showed that while learners from the instruction group explicitly explained the rule and had generalised on the basis of the exemplars, the non-instruction groups, especially the memorization group2 could not do so. Learners in memorization group1, on the other hand, acquired the rule albeit imperfectly.

Although Yu interprets his results in terms of easy versus harder realisation of rules in test sentences, there seems to be some problems with the design of the study. For example, sentence on which the second memorization group was tested had a double 'despite' which makes it more incomprehensible than harder for the realisation of the rule.

The above account suggests that L2 classroom learners need some kind of minimum tutoring or instructions as opposed to mere exposure to the memorized text or memorization for the sake of memorization to find a way into rule learning. Even Myles et al's (1998) study (see section 6.2.4), where teachers denied having taught the learners any rule, it was thought impossible that learners would not have been given some kind of instruction on grammar rules.

6.3 Discussion

In this chapter we focussed on the relationship between memorization and L2 learning with implications for Quran memorizers in terms of their developing sensitivity to morphological patterns. Findings from the literature suggest that memorization leads to different amounts of language learning in various learner populations. We are now in a position to answer the two review questions posed at the start of this chapter:

(1) Does repetition and rehearsal of memorized sequences lead to awareness of grammatical patterns?

(2) Are there conditions under which repetition of memorized sequences results in differential language development?

These questions will be answered on the basis of the following key findings that have emerged from the narrative above.

- Interactional use of memorized material is an important condition for learning the language.
- Repetition and rehearsal of memorized material can result in awareness of grammatical patterns.
- Memorization can be an effective strategy to release the constituent parts in order to combine them anew.
- Risk-taking with memorization may be a signal of developing language knowledge.
- Comprehensible input is necessary for learning the language.
- Some sort of instruction might be necessary to abstract/learn a rule in classroom L2 learning.

An important finding that emerged from the literature was that memorization/repetition increases the frequency with which the form is available to the learner. The process of repeating a linguistic form may be likened to turning the spotlight on a particular object or a place to make it more noticeable and salient than it would be without such repetition. For the Quran memorizers it means that regular repetition and rehearsal of the text might make them notice patterns and regularities therein. It was suggested that even without understanding the language, repeated exposure to pairs of forms might enable the memorizers to predict what will come next when encountering the first of the pair in a new text. It's like seeing a large group of people milling around in a room over several days. You start to notice that certain people are always in the company of certain others. In the end, you can predict, in seeing

person A, that person B is likely to be nearby. In linguistic terms, someone who has memorized a text in which every time a given preposition occurs, there is one of a limited set of endings on the following word, should become alert to the possible patterns. Similarly, if they always encounter a plural verb morpheme after a plural pronoun, then even if they don't know it's plural they might recognise the coincidence of the forms.

Every repetition thus might enhance the intuitive understanding of the language patterns, enabling the learners to carry out implicit analysis on patterns. In other words, the more learners repeat and recite exemplars, the more they abstract schematic knowledge on the basis of regular and shared morphological features. Hummel and French (2010) even suggested that repetition may enable a learner to attend to formal properties of a language in the absence of any language learning goal. It means that frequency may be a key to developing implicit awareness or a sense of what words or morphemes go with what other words or morphemes to make grammatically correct albeit meaningless strings. It might be argued that the Quran memorizers' exclusive concern with form as opposed to understanding and meaning might lead them to perform well on a grammaticality judgement task (see chapter 7, Task two).

The research literature suggests that memorization leads to language learning when a learner extracts patterns by segmenting and analysing the text to reuse and (re)combine them creatively. It was however noted that segmentation of memorized chunks was contingent upon certain conditions, such as the interactional use of memorized sequences which itself entails some sense of what the chunks mean. The interactive use of language in both naturalistic and classroom conditions in turn results in the learners' need to use it creatively. Hakuta's and Fillmore's studies in natural settings and Myles et al's study in classroom setting emphasized this aspect of a relationship between memorization and language learning. Although learners in these studies made creative use of language to a different degree due to differences in their learning conditions, the urge to use the language creatively was central to the learning outcome. Since the Quran memorizers, although often beginning their learning at a similar age to the children featuring in these studies, do not use the input interactionally, this issue is central to whether or not they will develop implicit knowledge of the language. Chapter 7 will give us some insight into this. We will come back to these issues in the final chapter.

Moreover, results from studies on the role of memorization on L2 learning in classroom conditions suggested that memorization on its own may not lead to the learning of form, and

some kind of tutoring on form or rule-learning might be necessary to trigger grammatical learning. Ding's (2007) Chinese classroom learners, for example, were getting language instruction including vocabulary, grammar, and tests, etc. Memorization was just one additional resource for them. Similarly, it was noted that Myles et al's (1998) classroom learners, in addition to memorizing the form, might also have received some minimum instructions on rule-formation. This is contrary to suggestion that pure frequency of exposure can result in implicit knowledge of the language. This apparent contradiction can be attributed to differences in learners and learning conditions. For example, while child L2 learners in interactional conditions use memorized sequences to segment and abstract rules, adult and teenage classroom and naturalistic learners might need some instructions to effectively segment and internalise rules. Chapter 7 will throw light on whether the Quran memorizers are able to develop sensitivity to pattern recognition on the basis of repetition alone or they need some sort of instruction on form.

The existing research literature suggests that there is a positive relationship between risk-taking and language learning. That is, as one learns more of the structure and movable parts of the language, one can try to express ideas one has never seen expressed before. One is less bound to only replicate previous input, and that means one can pay less attention to its fine detail, relying on one's independent knowledge of how the language is constructed. However, it was noted that there is an unintended consequence to risk-taking. A successful outcome relies on the individual really having command of the language structures, when constructing text. And that depends on his or her ability to bridge the gap between recognising patterns (receptive knowledge) and producing them (productive knowledge).
If that bridge is inadequate, then it will be easy for errors to creep in during recall. The issue of risk-taking and Quran memorization will be discussed in detail in the final chapter.

This chapter has suggested that memorization can help internalise language patterns of an L2. Fig 6.1 captures this process of learning.

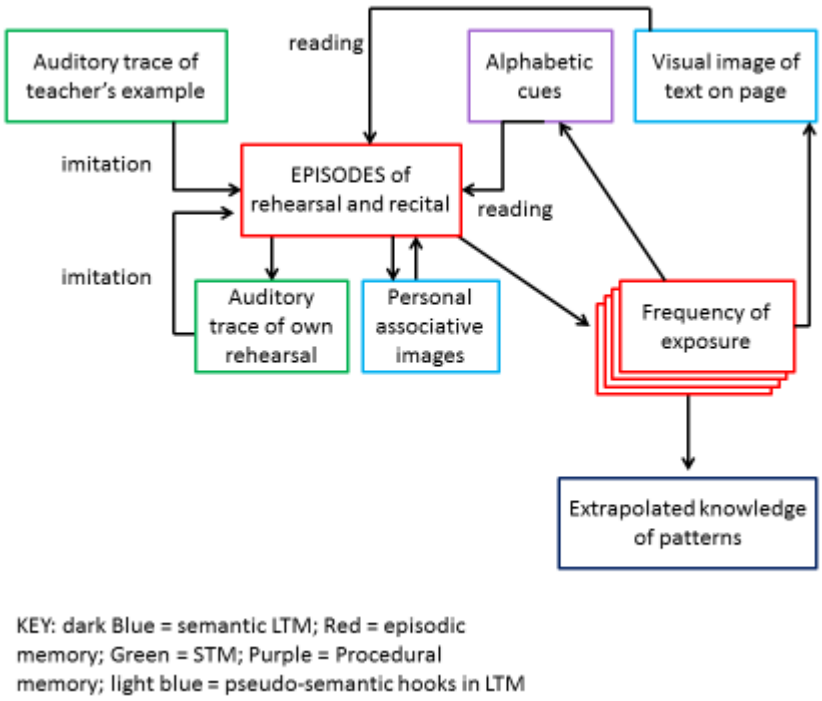


Fig 6.1: Stages in memorization of the Quran and learning of language patterns

The model as outlined in the above diagram indicates how frequency of exposure might lead to the extrapolation of language patterns. The model delineates stages involved in the process of learning. It is important to note that while most models of learning move down from STM to LTM (see chapters 3 and 4), my model actually has two dynamics: down from the top and up from the bottom, the main focus being the centre of the diagram i.e., episodes of rehearsal and recital. An arrow from 'frequency of exposure' to 'extrapolated patterns' in semantic LTM indicates that if one encounters correct patterns enough, he/she should end up with a capacity to notice whether a new string conforms to it or not.

But will this be the case for the Quran memorizers? In the light of the memorizers' rather unusually frequent repetition and recitation of the text (see chapter 5), it can be predicted that they would develop an understanding of sound and structure of the Classical Arabic. In other words, they would develop a 'feel' for the Quranic language, and would be able to judge how a grammatical sentence in the Classical Arabic sounds. If so, they should be able to extrapolate and generalize to new contexts to decide whether a particular sentence from some unknown and unseen text in Classical Arabic was correct or incorrect.

However, we have seen that there are certain differences between Quran learning and other types of language learning, particularly the absence of several typical features: comprehensible input, interactional use, form-based tuition, and interest in developing the language creatively. Are these differences sufficient to interfere with what previous research has tended to suggest are inevitable outcomes of repeated exposure to input?

The next chapter will report language data from the Quran memorizers to establish whether or not they have developed some awareness of patterns of Classical Arabic. The results will give us an insight into what kind of learners they are: rote-learners who repeat the text at surface level with no insight into the language system, or learners with an insight into the language structure of Classical Arabic.

Chapter 7

Sorting tasks: methodology and data analysis

7 Introduction

In chapter 5, the interviews with the Quran memorizers indicated that non-Arabic speaking memorizers learn the text in a strict methodical fashion. It was shown that memorizers are groomed and trained for memorization from quite an early age. They start with learning Arabic letters and sounds and gradually move on to making 'words' out of them. Their knowledge of 'words', however, is restricted only to phonology, that is, they utter and pronounce them without knowing the meaning. After this basic training in forming Arabic letters and reading them out (i.e., phonetic decoding of Arabic words), they are taught to read the Quran. Once they have read the whole of the Quran, they start memorizing it. It was revealed that in addition to employing various techniques to acquire and retain the text over the short and long term, the Quran memorizers energetically engage in rehearsal of the text throughout their lives. They never cease to practise.

In chapter 3 it was proposed that if the Quran ended up in the memorizers' long term memory, the text might be organized along semantic lines in the mental lexicon and the memorizers would show sensitivity to morphological patterns of the language. Moreover, as suggested in chapter 6, repetition and rehearsal of the text might lead to bootstrapping of grammatical knowledge. On the basis of cumulative evidence from the literature as presented in chapters 3, 4 and 6, it was predicted that the Quran memorizers would be able to show some awareness of the morphological patterns of the language. This chapter reports an investigation of the memorizers' incidental awareness of such patterns.

The chapter is divided into two sections. Section 7.1 introduces and discusses the research tools used for collecting and analysing data, and method of recording and transcribing them. Section 7.2 presents analysis and results of the data.

7.1 Methodology

7.1.1 Choosing a data collection tool

The study aimed at judging the participants' intuitions about the grammaticality of sentences in Classical Arabic. They were to explicitly state whether a particular sentence presented to them sounded right or wrong and if they could locate the error in the sentence identified as wrong. The purpose was to infer the sensitivity of the participants to the grammatical system of Classical Arabic.

In order to investigate Quran memorizers' awareness of morphological patterns, one potential data collection method, that is, the cloze test (i.e. fill in the blank exercises) was considered as a possible candidate. Although cloze tests measure a learner's knowledge of the language grammar, these tests require knowledge of context and vocabulary too. Moreover, I was concerned with receptive, and not productive knowledge of the language of my participants. As these tests concern themselves more with measuring language use or production—a broader knowledge of language than was predicted for these learners—the cloze test was discarded in favour of a more appropriate method, i.e., sorting.

Sorting gives us a measure of the learners' receptive knowledge of the language grammar without the burden of comprehension or production. By sorting sentences according to whether they were grammatical or ungrammatical, participants were expected to reveal their intuition regarding what 'sounds right' on the basis of the patterns they had encountered in the Quran. Sorting was thus aimed at tapping into the participants' subtle intuition about the language. The reasoning for this was simple: the memorizers' ability to notice patterns would give us a clue about any implicit knowledge emerging from their exposure to the Quran. This is consistent with models of learning based on frequency of exposure to input. However, some research i.e. Krashen (1981, 1985) and Chinese formulaic learning studies, (see chapter 6) says that for learning to take place it is comprehensible input that is required. As a result, it was not clear what would happen, because of the absence of specific understanding of the text during memorization (see final chapter for more discussion on this).

Two sorting tasks were administered: (a) separating Quranic verses from non-Quranic sentences to judge the participants' memory of the Quran; and (b) separating correct from incorrect sentences to judge the participants' implicit awareness of patterns in Classical Arabic.

Hypotheses were formulated for the two tasks on the basis of evidence from literature. The justification for hypothesis one was provided by the literature in chapters 3 and 4. It was indicated that by virtue of regular and frequent repetition of the Quran text, the text might not only be transferred to long term memory but the memorizers will also be overfamiliar with the sight and sound of the Quran text. As a result, they will be able to recognize the Quranic sentences in midst of unseen non-Quranic text in Classical Arabic.

For hypothesis two, the justification came from chapter 4 and 6, respectively. Literature in chapter 4 indicated that by having a large text in the long term memory, memorizers might derive rules by streamlining their memory along semantic lines. This in turn would enable the memorizers to develop some insights into/awareness of morphological patterns of Classical Arabic. Chapter 6 on the other hand suggested that regular repetition and rehearsal of the text might make the memorizers notice patterns and regularities therein. Repeated exposure to pairs of forms, even in the absence of meaning, might enable the memorizers to predict what will come next when encountering a new text. The memorizers on the basis of the memorization of the Quran in Classical Arabic would therefore be able to differentiate between correct and incorrect sentences in any Classical Arabic text from the same time as the Quran.

Task 1:

Experimental hypothesis: The non-Arabic speaking memorizers will be able to separate Quranic verses from non-Quranic sentences.

Null hypothesis: The non-Arabic speaking memorizers, will not be able to separate Quranic verses from non-Quranic sentences beyond the level of chance.

Task 2:

Experimental hypothesis: The non-Arabic speaking memorizers will be able to separate morphologically correct sentences from incorrect ones.

Null hypothesis: The non-Arabic speaking memorizers will not be able to separate morphologically correct sentences from incorrect sentences beyond the level of chance.

7.1.2 Stimuli

Three different sets of sentences from Arabic were used as study material:

(1) 15 sentences from the Quran
(2) 15 Non-Quranic sentences from Classical Arabic without an error
(3) 15 Non-Quranic sentences from Classical Arabic with an introduced morphological error

Verses from across the Quran were chosen to avoid clusters of verses from one or another part of it. However, as two participants had not memorized the whole of the Quran, they were tested on verses from only those Parts they had memorized (see section 7.1.3). To avoid repetition of themes, care was taken to not select verses centred on a particular topic. There are some themes that the Quran repeatedly addresses and Muslims are over-familiar with them due to the daily recitation in prayers or due to repeated reference to them by Imams (Islamic religious scholars) during sermons. Therefore, verses about less repeated themes or those less familiar to participants or those which do not make part of the daily worship were selected for the study.

For task 1 which was concerned with the participants' memory of the Quran, some sentences (i.e. distractors) were needed that were like Quran sentences but not from the Quran. Task 1 was conducted to judge the participants' memory of the Quran text to see if their memorization enabled them to correctly recognize Quranic from the not-Quranic. This would also help us interpret results of task 2. They needed to be in the same language and style as the Quran and were taken from texts in Classical Arabic written about the same time as the Quran. Thirty distractors (non-Quranic sentences) were used alongside 15 Quranic sentences.

To select the distractors, the services of an expert of Classical Arabic at Oxford University were acquired[7].

For task 2, the thirty non-Quranic sentences (fifteen correct and fifteen incorrect) which served as distractors in task 1 were used, so they had all been seen before. Three grammatical features were selected to be used as error-types: number (singular/plural), gender (masculine/feminine), and case (a grammatical feature showing a noun or a pronoun's role in a sentence). There were five examples of each error type. Five instances of each error type were thought a reasonable number for a participant to reveal awareness of anomalies in agreement. The remaining fifteen sentences were used as a correct set. Thus, sentences with errors were completely different from sentences without errors.

Because the task involved the introduction of errors, only non-Quranic sentences could be used. The language and wording of the Quran cannot be paraphrased nor rearranged because of its sacred nature. Any attempt to do so would amount to blasphemy. Therefore both the correct and incorrect sentences were chosen from texts other than the Quran.

Errors in sentences were inserted keeping in view that the error must be indicated in the morphology without needing to know the meanings of words. For example, for a gender pattern to be incorrect, two markers, one that is correct and one that is incorrect had to be in the sentence. The correct one needed to be another morpheme that the participants had encountered many times, not a noun that they had not encountered much if at all, or that carried the gender in its semantics. As illustrated below, a sentence might contain 'He ...himself' (correct) or 'He …herself' (incorrect) but not 'The man ...herself' because a participant would need to know that 'the man' referred to a masculine object in order to spot the error. So, the incorrect morpheme had to prompt participants to notice the error because they had encountered both the correct and incorrect morphemes before, but never together in that pattern. For case, advantage was taken of the fact that all Classical Arabic prepositions should be followed by a noun or pronoun in the genitive/possessive case, marked by 'i'. If in a sentence, a preposition is followed by a noun or pronoun marked for an accusative case i.e., 'a', or a nominative marker 'u', then it should be an indication to the participant that something is wrong with the sentence—it would/should not sound right to him. For example, the Arabic relative pronoun *li-llaz**īna*** is marked for number and gender and stands for

[7] I am extremely thankful to Professor Gerard Van Gelder from the University of Oxford for his invaluable help in selecting and modifying sentences for my experiment.

"(they/those) who" masculine plural, and is clearly marked by a plural marker ***īna***. So, if a sentence has *llazīna,* then the rest of the pronouns/nouns should be morphologically marked to agree in number and gender. In sum, regular co-occurrences of morphological features should be recognizable and deviations from the regular patterns should be detectable: memorizers would know how morphological features should go together and any deviation from the norm might alert them to the incorrectness.

I will explain the principle underlying the correctness judgement test in this study with the help of some examples in English. Below are sentences with correct and incorrect versions, in three categories of gender, number and case. Examples in English are followed by actual sentences used in the test with gloss and translation. The morpheme marking a word correct or incorrect is highlighted in bold:

Gender

Correct: She washed **her**self.

Incorrect: She washed **him**self.

Number

Correct: She felt an itch on **her** nose.

Incorrect: She felt an itch on **their** nose[8].

Case

Correct: They gave the book to **her**.

Incorrect: They gave the book to **she**.

In the above examples, we can see that correctness or incorrectness is morphologically marked and can be derived from the structure of other morphological markers. So if a person sees or reads correct patterns often even without knowing the language, they could be

[8] In fact, this English example violates one of the important design rules of the task two sentences, because one needs to know the meaning of 'felt' and/or 'itch' in order to see the non-agreement (compare 'She saw a fly on her/his nose' which are both alright). However, this is because English carries very little morphological marking, making it very hard to construct sentences with agreement. The sentence is for illustration only, and is not a perfect match for what was possible in Classical Arabic.

expected to develop sensitivity to when a morpheme marking gender, number, or case is correct or incorrect. In other words, they would be expected to spot the error when confronted with an incorrect version. As the purpose of my study was to judge the participants' intuition and feeling that something was not quite right with a sentence, care was taken to avoid anything that relied on participants knowing the meaning of the words.

Below are some examples of sentences from Classical Arabic used in the test.

Gender

Correct*:* Wayla-**kum** l-ajra ta'khuz-**ūna** wa-l-a'mal-a tufsid-**ūna** sawfa talq-**awna** mā tahzar-**ūna**.

Incorrect*:* Wayla-**kunna** l-ajra ta'khuz-**ūna** wa-l-a'mal-a tufsid-**ūna** sawfa talq-**awna** mā tahzar-**ūna.**

Translation: Woe unto you! You take wages but perform bad work. You shall encounter what you are afraid of.

Number

Correct: La tastazilla l-faqīr-a wa-la taghbite-l-ghanniya wa-**kun** enda zikr-ī Khāsih- **an.**

Incorrect: La tastazilla l-faqīr-a wa-la taghbite-l-ghanniya wa-**kun** enda zikr-ī Khāsih- **īna.**

Translation: Do not despise the poor and do not envy the rich, and be humble when mentioning Me.

Case

Correct: Inna l-Allāh-kariha la-kum l-a'bas-a **fī** l-salāt-**i** wa-l-rafas-a fīl-seyām-i.

Incorrect: Inna l-Allāh-kariha la-kum l-a'bas-a **fī** l-salāt-**a** wa-l-rafas-a fīl-seyām-i.

Translation: God does not want you to be frivolous during ritual prayer or to behave indecently during fasting.

In the above examples, we can see that correctness or incorrectness is morphologically marked and can be derived from the structure of other morphological markers. For example, in the gender sentence, the interjection *waylakunna* ("woe unto you!") that opens the sentence

suggests that women are being addressed (the pronominal suffix –kunna is 2nd ps. feminine plural). The rest of the sentence, even though obviously the same persons are addressed, contains four verbal forms marked as masculine plural by the ending *–ūna or -awna*. Evidently, either *waylakunna* is an error for *waylakum* ("woe unto you", masc. plur.), or the four verbs are all wrong (instead of the masculine plural forms t*aʾkhudhūna* "you take", *tufsidūna* "you spoil, corrupt", *talqawna* "you encounter", and t*aḥdharūna* "you are afraid", one should expect the feminine plural forms *taʾkhudhna, tufsidna, talqayna, and taḥdharna*, respectively. In number sentence, the imperative *kun* ("be") is masculine singular and according to the rule of Arabic grammar the predicate is correctly given in the accusative. However, *kun* is singular and the predicate should also be in the singular: *khāshiʿan* ("humble"); therefore *khāshiʿīna*, with the plural marker *–īna*, is evidently incorrect. *Khāshiʿīna*, would be correct if the imperative was plural, that is, kūnū instead of the singular *kun*. The plural of *tastazilla* and *taghbiti*, the other two imperative singular verbs, would be t*astazillū* and *taghbitū*. This shows that there are three indications of masculine singular and how they would look different if they had been plural, leading up to a plural ending on *khasih*. As far as the case sentence is concerned, per the rule of Arabic grammar, every preposition in Arabic must be followed by a noun or pronoun in the genitive. In this sentence, *fī l-ṣalāta* is a mistake because the preposition *fī* ("in") is followed by a noun that has the marker of the accusative, *-a*. Correct would have been *fī l-ṣalāti*, with genitive marker *–i*.

See appendix C for the sets of correct and incorrect sentences of Arabic along with transliterated version and the English translation.

Task three involved discussion with the participant about the sentences he had identified as incorrect and was meant to investigate the participants' intitution—what they said about their sense of what was wrong. The task was in two parts: (a) to identify the error; and (b) to correct it.

7.1.3 Participants

The selection of appropriate participants was an important step in conducting the study. Various issues such as knowledge of Arabic and language and cultural background of participants were kept in mind while making the selection. The participants needed to be memorizers without any chance to have learned any Arabic. I therefore couldn't use teachers

because they normally had studied Arabic at some level. To find participants I went to the mosque schools. Although children as young as 12 years old attend these schools, I restricted enrolment to informants aged 18 and above to make consent easier. I wanted people who were roughly equivalent to what my informants from study1 (i.e. the Quran teacher-memorizers) would have been like at an earlier age, so I could draw inferences across the two studies. Participants from one language and cultural community were selected to avoid confounding variables.

Participants from the same language backgrounds as study one, that is, Pashto and Urdu were chosen (See chapter 5, section 5.1.3). To control for any independent routes to learning, participants were asked about any formal or informal learning of Arabic, and those who had learned Arabic independently of the Quran either at home or in a formal school setting were screened out. The teachers also confirmed whether a participant had been trained in Arabic or not. The participants' use of Arabic was thus limited to recitation of the Quran only, suggesting that the Quran was their only source of knowledge of Arabic.

Nine participants were tested for the main study, and two participants were tested for the pilot study (see section 7.1.4 for description of the pilot study). Originally, more participants were planned, however, as reported later, the results across participants were so similar that testing more learners seemed unproductive. Instead, a small supplementary study on another population was conducted (see section 7.3).

Participants from three different mosques in Cardiff were selected, to avoid any bias that might arise. Testing participants from one mosque, for example, could limit the representativeness of the data, if memorizers from different mosques and studying under different teachers developed different techniques for learning. The intention was only to test individuals who had memorized the whole of the Quran or were near completion. There were, however, two participants who had not yet finished (Participant 5 was memorizing the 14th Part, and participant 9 was memorizing 21th Part. It is important to note that the Quran is divided into 30 Parts). They were included because two other participants who had promised to be part of the study were not available and could not be contacted. In Task 1, they were tested on verses from only those Parts/chapters they had memorized. While the participants were all born in the UK, their parents were born in Pakistan.

The teacher-in-charge at the mosque was the first point of contact. The participants were accessed through him and other teachers. Before meeting the students, the teacher-in-charge was briefed about the purpose of the research.

Participants showed a lot of enthusiasm to participate in the test. I told them that these results would be reported in my PhD thesis. They were also told that their identity will be anonymized and they would be referred to as participant 1, 2, etc. Participants were requested not to share information about the test with other fellow students because it was possible that they might be tested too, to which they agreed. A consent form duly approved by the Ethics Committee of Cardiff University was given to the participants to sign, saying that they agreed to my using the data for research purposes.

7.1.4 Pilot study

A pilot study was conducted to find out the length of the whole activity, the effectiveness of the instructions for each task, and the nature of the participants' response. Two Urdu-speaking memorizers were tested in two different mosques in Cardiff. The first participant was 22 years old and had memorized the whole Quran four years back. He had been teaching the Quran for a couple of years but his training had not included any study of Classical Arabic. The second one was 20 years old and had memorized the whole Quran two years back. He too had not studied any Arabic. The tests took place in a room adjacent to the main hall of the mosque, and lasted for 50 and 55 minutes, respectively.

The pilot responses alerted me to making some minor changes to the main study. For example, from the first pilot informant I learnt that I needed to be very clear while giving instructions about what a participant was supposed to do in the grammaticality judgement task. That is, he needed to read the sentences out and give his verdict in terms of grammatical correctness or incorrectness instead of talking about the orthographic details. Thus, in my main study I very clearly instructed the participants to overlook how a word was written and to focus instead on how a sentence sounded to them. The second pilot investigation indicated a problem with regard to the participant's attention and focus while reciting a sentence. In the main study, I therefore asked my participants not to hurriedly run through the sentences and, rather, carefully listen to themselves while reading them out.

Despite the minor changes made to the design between the pilot and the main study, it was reasonable, owing to the comparable nature of the pilot and main studies, to include the two pilot results as part of the main dataset. The total number of participants is, therefore, eleven.

7.1.5 Procedure

At the start of the test, participants were told about the nature of the test but nothing was said what it aimed at. I felt that telling them in advance about the purpose of the test would make them unnecessarily conscious or anxious about their knowledge or understanding of Arabic. They were told that they were participating in two sorting tasks, followed by a short discussion. To familiarize them with what they were to do, I demonstrated the tests to them by performing the tasks in front of them. It is important to note that I demonstrated the activity to them by putting cards into piles but not the correct ones. The purpose was only to show them how to do the tasks, so care was taken not to perform the task correctly for them. As the tasks were simply separating sentences into two piles, the participants understood them quickly. I encouraged them to ask questions if they were not clear about anything. As there were three different tasks to perform, each task was preceded by appropriate instructions. The tasks were carried out in a fixed order, that is, task one was done first, followed by task two, followed by task three. Although in many studies it is appropriate to vary the order of tasks across participants to neutralise any practice or fatigue effect, but here there was no such option, because the tasks were consequential on each other. The participants were given as much time as they needed for each activity (See appendix D for a complete set of instructions). Participants were told that their participation was entirely voluntary and that they could leave any time they wanted. No participant left the study though.

The cards for task 1 were in red while the cards for task 2 were in yellow. The actual sentences were black print on white paper, but cut out and stuck onto coloured cards. The colour was of no relevance to the participants though, and there was no mention of it to them. It was only to help me keep the stimuli sets separate. All cards were numbered to name and identify sentences for use during the experiment, and later for analysis. Non-Quranic sentences in both tasks, however, carried identical code numbers to facilitate the identity of cards for analysis in each task. Instead of sequential or alternative numbering, sentences were

arbitrarily numbered to prevent participants from spotting any pattern in the identification. All sentences were numbered in three digits, that is, in the hundreds.

All participants were tested individually, one participant per day. The test was conducted during the memorization time in a room of the mosque with teachers and students present in the adjacent main hall. The entire session was conducted in English and was audio-recorded with the participant's permission, using a digital voice recorder.

Task 1: Two large cards were laid out, one reading 'sentences from the Quran' the other 'sentences not from the Quran', far enough apart to be sure which pile/card each item was put onto. A pile containing forty five sentences (fifteen from three categories each) was put in front of the participant. The three categories were: Quranic, non-Quranic (correct), and non-Quranic (incorrect). The correct distribution across categories was thus 15 (Quranic) to 30 (non-Quranic). The voice recorder was switched on and the participant's identity number and the date of the test were spoken. The participant was then told to pick up a card, read the sentence aloud, and say whether the sentence was from the Quran or not, and to put the card on one of the large cards in front of him.

Despite the voice recording, orderly notes, using a pen and a notebook, were kept to know which cards went onto which pile during the experiment in case the audio recording failed. The name of the participant and the date were already written on the notebook in which scores were being written down. Grids had been set up in the note book for this purpose. For example, two columns were created, i.e., judged Quranic and judged as non-Quranic, and as the items were allocated, the number on the card was written down in the relevant column. An extra, large column for notes was also created to write down an item that the participant found particularly troublesome alongside insights from his behaviour about why.

To keep a record of a participant's assigning sentences to one of the two categories, the card number was said aloud by me while it was being allocated to a particular category. The activity was recorded, so a participant's verdict on each sentence could be traced back if required. For example, when a participant had read out and given his verdict on a sentence and put it on a pile he thought appropriate, I would read the number of that particular sentence aloud by saying "So you've put sentence X on the Quranic pile".

All Quranic verses and non-Quranic sentences were presented in the same font, style and colour. So, there was no discrepancy in the visual presentation of both types of sentences. To keep the order of the cards random, cards were shuffled up several times in advance of the task.

After a participant had sorted out all forty five sentences into two separate categories, the sentences assigned to the Quranic pile were clipped together and put into a plastic bag marked as Quranic, while sentences assigned to non-Quranic category were put into a plastic bag marked as non-Quranic. The bags were made of transparent see-through plastic with the participant's code written on each bag. A clear record was maintained for each participant against his name for the sorting and categorisation he did. At the end of the task, the two bags were moved away.

Task 2: A fresh set of thirty non-Quranic sentences (fifteen correct and fifteen incorrect, all written on cards of a different colour used in task one) was brought before the participants. All these sentences had been seen by them in task one. Two large cards were placed on the table, reading 'sentences with errors' and 'sentences without errors'. The cards were laid far enough apart for me to be sure which pile each item was put onto. A participant was told to pick up a card, read the sentence aloud and separate the grammatically correct sentences from the ones with an error in them.

After a participant had sorted out all thirty sentences into two separate categories, the sentences assigned to the 'without an error' category were clipped together and put into a transparent bag marked as 'without an error' with the participant's code written on it. Sentences identified with an error in were not put into a bag at this stage because these were to be used for the discussion task (i.e. Task 3). While the 'without an error' cards were put in separate bags and were moved away to one side, the pile of cards identified as having errors in was brought to the front for a discussion.

Task 3: participants were asked to discuss sentences which they identified as wrong, and were prompted to come up with an opinion about each sentence. For example, a participant was usually asked: "You said that you felt there was an error in this somewhere. Can you read the sentence aloud and point to where you think it is"? If he felt hesitant, he was encouraged by prompts such as, "Well do you feel it's nearer the start of the sentence or the

end of it? Read the first half: do you sense the error already? Read the second half. Do you feel the error is with a particular word? Which one might it be? Do you sense that the error on that word is at the beginning, in the middle or at the end? Do you have any sense, however faint, of what the correct version should be"? It would not be out of place to mention here that not all the sentences they were looking at actually had an error in, because I was asking about the ones they *assigned* errors to, not the ones that necessarily *had* errors.

Afterwards, the recording from each participant was carefully listened to and the results were tallied to the ones on paper.

7.1.6 Selecting a statistical test

As I wanted to know if the differences in distributions of Quranic and non-Quranic sentences on the one hand, and correct and incorrect, on the other, were significant, the Chi-square test was used to measure the differences in distribution in both tasks. The Chi-square test is a statistical test that is used to establish (by comparing participants' observed and expected scores) whether observed frequencies are significantly different from expected frequencies. In other words, the Chi-square test measures how likely it is that an observed distribution is due to chance, or the difference in results is due to a difference between the groups.

For the data of this study, the Chi-square test would determine how likely or unlikely it was that the Quran memorizers' observed distribution of sentences into Quranic and non-Quranic, and correct and incorrect categories was related to their memorization. However, as some issues arose with the values in the cells (i.e. some values were less than five), a Fisher's exact test was also used. There is no issue with minimum expected values in the Fisher's exact test, so we can present results for each participant separately[i].

Given the relatively small number of participants, Chi-square values were calculated with the help of an electronic calculator. For Fisher's exact text, values were calculated using online calculator[9].

[9] http://quantpsy.org/fisher/fisher.htm

7.2 Results

This section reports data analysis and results. The empirical investigation was driven by the following questions:

(1) Can the Quran memorizers separate Quranic sentences from non-Quranic sentences?

(2) Can the Quran memorizers reliably separate grammatically correct sentences from grammatically incorrect sentences?

(3) Can the Quran memorizers indicate errors in the sentences they have identified as incorrect?

For each participant a complete profile of his score was created, showing the number of actually Quranic and non-Quranic sentences against the number judged as Quranic and non-Quranic in task 1, and actually grammatical and ungrammatical sentences against the number judged grammatical and ungrammatical in task 2 (see appendices F and G for individual results on Tasks 1 and 2, respectively).

7.2.1 Sorting task 1: separating Quranic from non-Quranic sentences

According to the results, the participants reliably separated the Quranic sentences from the non-Quranic sentences. As per the individual results, participants can be grouped in the following four categories:

A. Those who accurately separated sentences into two piles of 15 (Quranic), and 30 (non-Quranic), respectively. They were participants 6, 7, 8 and 10

B. Those who allotted fewer than 15 sentences to the Quran pile. They were participants 3, 9 and 11. However, all sentences they assigned to the Quran pile were actually Quranic, and there was no non-Quranic sentence in the Quran pile.

C. Those who assigned more than fifteen sentences to the Quranic pile. They were participants 2, 4 and 5. Although they had more than 15 sentences in the Quran pile, all 15 Quranic sentences were in the pile too.

D. There was one participant (i.e., participant 1) who, despite having identified 15 sentences as Quranic, had only assigned ten Quranic verses to the Quran pile. Five of them were actually non-Quranic. His was by far the lowest score in terms of correctly identifying Quranic sentences.

While results from group A are clear-cut and show solid and reliable memory of the participants for the Quran, participants in groups B, C and D allocated a variable number of sentences to both piles. This distribution offers an interesting window on the participants' memory of the Quran. Participants in group B, for example, assigned only those sentences to the Quran pile they were sure about. Hence, although all the sentences they assigned to the Quran pile were Quranic, not all the Quran sentences were included. So, some of the Quranic sentences were assigned to the non-Quran pile. In group C, on the other hand, participants tended to include more sentences in the Quranic pile than in the non-Quranic pile. The Quran pile, however, included all the Quran verses. It means that these participants were not taking any risk of missing out a Quranic sentence and therefore erred more on the side of inclusion than exclusion. In other words, they did not want to relegate a Quranic sentence to the non-Quranic pile.

Table 7.1 shows combined results for all participants. The rows show the number of actually Quranic and actually non-Quranic sentences, and the columns show the number of sentences judged as Quranic and non-Quranic by the participants.

Combined	Judged as Quranic	Judged as non-Quranic	Total
Quranic	156	09	165
Non-Quranic	30	300	330
Total	186	309	495

Summary Table 7.1: combined results for Task 1

The Chi- Square results for all participants were highly significant. Results obtained from Fisher's exact test were also highly significant.

Participant	χ^2	Df	P <
1	11.5	1	0.01
2	21.523	1	0.01
3	40.469	1	0.01
4	16.422	1	0.01
5	28.127	1	0.01
6	45	1	0.01
7	45	1	0.01
8	45	1	0.01
9	36.564	1	0.01
10	45	1	0.01
11	36.45	1	0.01

Table 7.2: The Chi- Square results for the number of Quranic and non-Quranic sentences out of total sentences

Figures 7.1 and 7.2 show the distribution of sentences into Quranic and non-Quranic categories, respectively. The participants were to separate 45 sentences into two categories. Each graph represents the judgement of each participant by two colours: in graph 7.1 red indicates sentences that were judged Quranic whereas blue indicates sentences that were actually Quranic. In graph 7.2 purple indicates sentences that were judged non-Quranic whereas black represents sentences that were actually non-Quranic. The sum of the two colours representing 'actual' i.e. red (graph 7.1) and purple (graph 7.2) amounts to the total number of sentences i.e. 45.

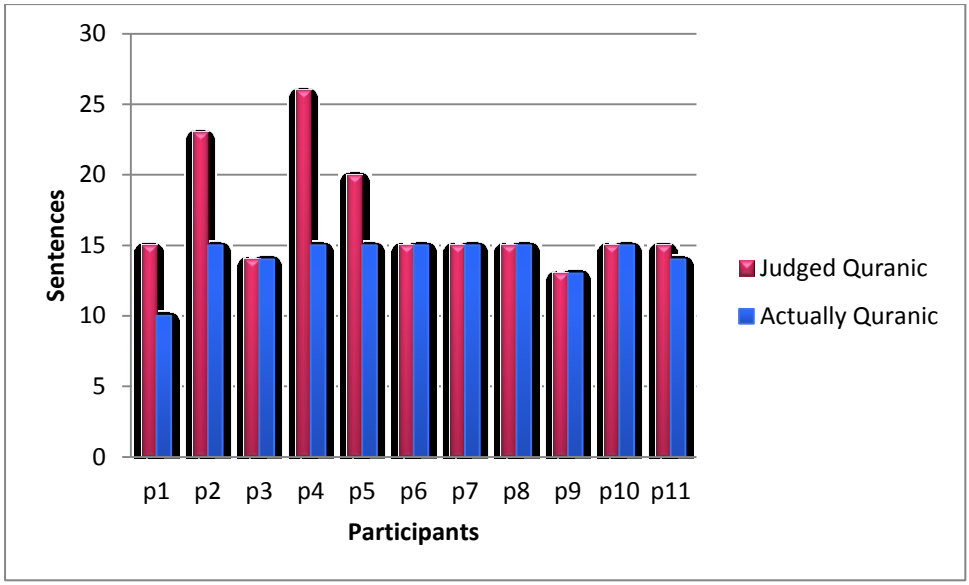


Fig 7.1. Distribution of sentences that were judged Quranic by non-Arabic participants

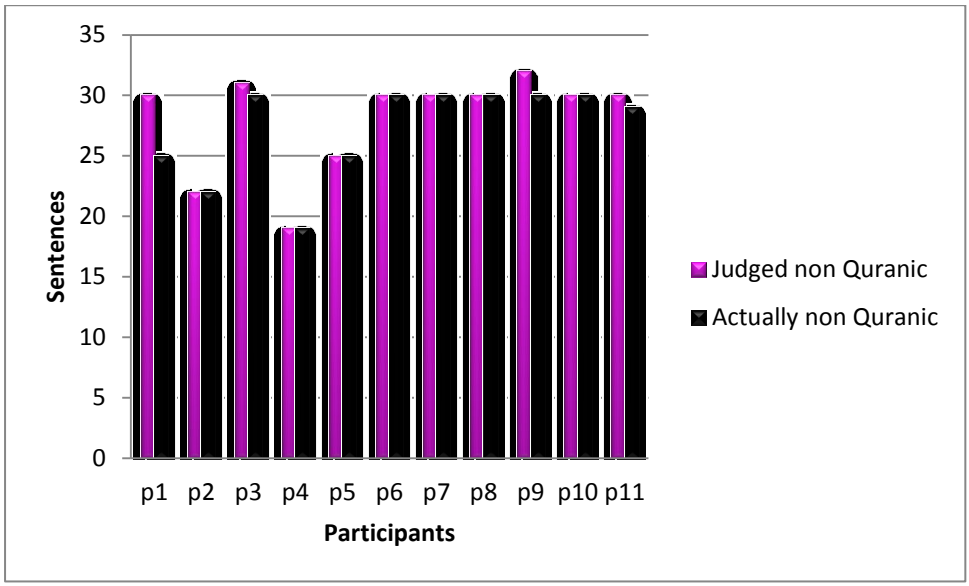


Fig 7.2. Distribution of sentences that were judged non-Quranic by non-Arabic participants

Overall, participants were more likely to put non-Quranic sentences onto the Quranic pile than vice versa.

The above results indicate that the participants had reliably secured the Quran in their memory. The strong memory of the participants for the Quran text was demonstrated by their significantly high recognition of Quran sentences when randomly presented in a pool of non-

Quranic sentences (matched to the Quranic ones for language and style). This is an important finding because Quranic sentences were presented out of context: they were individual and isolated sentences picked up from different parts of the Quran at random. On the basis of the above finding, the experimental hypothesis, that is, the non-Arabic speaking memorizers, on the basis of their memorization, would be able to separate Quranic sentences from non-Quranic sentences was accepted.

In addition to the above results, participants' behaviour while performing the task was also indicative of their superior memory for the Quran, showing that they had a strong mental representation of the Quran text as compared to the non-Quran text. Although their speed of response was not measured, there was a noticeable tendency for the Quranic verses to be responded to more quickly than the non-Quranic ones.[10] Most times when the participants saw a Quranic verse, they immediately recognized it as familiar. Most of them, especially, participants 6, 7, 8, 9, 10, and 11, after reading the first two or three words of a Quranic verse, would start reciting it from memory and would keep on reciting till I asked them to stop. In contrast, they were not fluent in reading sentences from unseen Classical Arabic texts and were, at times, finding it difficult to pronounce them correctly. I will come back to this issue in the final chapter.

7.2.2 Sorting Task 2: separating grammatically correct sentences from grammatically incorrect sentences

As is clear from table 7.3, participants assigned more sentences i.e., 198 to the grammatically correct category as compared to 132 to the grammatically incorrect category. It means that participants erred more on the side of perceiving correctness than incorrectness.

Combined	Judged as grammatical	Judged as ungrammatical	Total
Actually grammatical	95	70	165
Actually ungrammatical	103	62	165
Total	198	132	330

Summary Table 7.3: combined results for Task 2

[10] Research shows that frequent lexical items are more quickly responded to than infrequent items in lexical decision tasks. The quick reaction time for frequent words is attributed to a strong mental representation due the frequent occurrence of the items as opposed to the infrequent items (Ellis 2002; 2011).

As far as individual results are concerned, while there is a striking similarity across participants in assigning sentences to correct or incorrect pile, the distribution of sentences within each pile tells a different story (see appendix G).

The Chi-Square results for all participants were not significant. Results from the Fisher's exact text were statistically not significant either.

Participant	χ^2	Df	P >
1	0.5552	1	0.05
2	0.534	1	0.05
3	0	1	0.05
4	3.393	1	0.05
5	0.132	1	0.05
6	0.14342	1	0.05
7	0.14342	1	0.05
8	0	1	0.05
9	1.296	1	0.05
10	0	1	0.05
11	1.2	1	0.05

Table 7.4: The Chi- Square results for the number of actually incorrect sentences out of total sentences identified as incorrect

Figures 7.3 and 7.4 indicate the distribution of sentences into grammatical and ungrammatical categories, respectively. The participants were to separate 30 sentences into two categories. Each graph represents the judgement of each participant by two colours: in graph 7.3, the blue indicates sentences that were judged grammatical whereas the pink indicates that were actually grammatical. In graph 7.4, the orange indicates sentences that were actually ungrammatical whereas the green shows sentences that were actually ungrammatical. The sum of the two colours representing 'actual' i.e. blue (graph 7.3) and orange (graph 7.4) amounts to the total number of sentences i.e. 30.

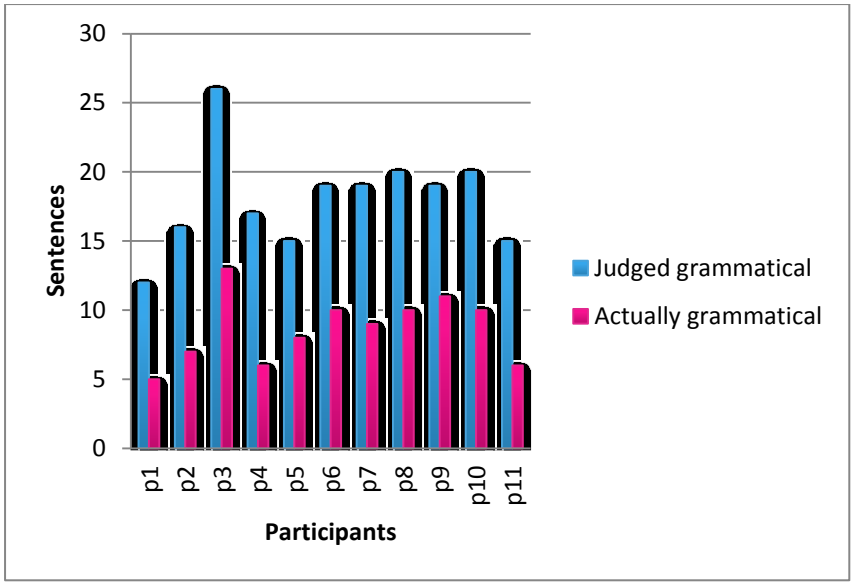


Fig 7.3. Distribution of sentences that were judged grammatical by non-Arabic participants

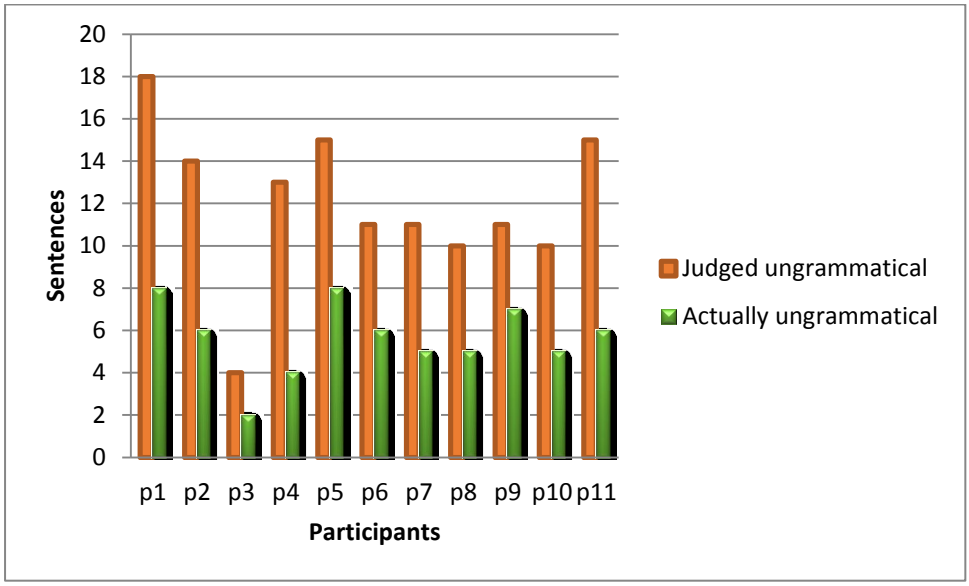


Fig 7.4. Distribution of sentences that were judged ungrammatical by non-Arabic participants

The above results indicate that participants separated grammatically correct sentences from grammatically incorrect sentences only at a chance level. It means that they had little clue of differences between correct and incorrect sentences in Classical Arabic, suggesting that they had internalized very little or no awareness of morphological patterns.

Considering the above findings, the null hypothesis, that is, the non-Arabic speaking memorizers, on the basis of their memorization, would not be able to separate grammatically correct sentences from grammatically incorrect sentences, could not be rejected, while the experimental hypothesis, that is, the non-Arabic speaking memorizers, on the basis of their memorization, would be able to separate grammatically correct sentences from grammatically incorrect sentences, is unlikely to be true. It means that Quran memorization, for the participants of this study, had not led to grammatical awareness and the observed distribution in the present study was only due to chance.

However, some of the stimuli were correctly categorised, and it was important to know the basis for their correct categorisation. Was it just chance, or did the participants have some intuition, however vague, about those specific items? In order to find out, I examined the correct and incorrect rates for each of gender, number and case, including information from the third task, which was explaining their belief that a sentence was incorrect.

7.2.3 Task 3—participants' comments on the sentences they categorised as 'incorrect'

An informal discussion with the participants indicated that in the majority of cases they did not know where the error was. However, in some sentences the participants not only found the exact location of the error but even also provided a correct explanation or replacement for it. There are three sides to this analysis: (a) correct allocation of incorrect sentences to the incorrect pile; (b) identifying the error in the sentences; (c) explaining the error or/and providing a correct replacement for the incorrect morpheme. While table 7.5 summarizes these results for each participant, table 7.6 presents the list of words with and without an error.

Participant	G1	G2	G3	G4	G5	N1	N2	N3	N4	N5	C1	C2	C3	C4	C5
1	A	I	A	A	A	A	A				A				
2	A	A		E		A					A	A			
3	A	A													
4					A		A	A			A				
5		A	A				A	A	A	A	I	A			
6	A	I	A					A	A			A			
7	I				I						A		A	I	
8		I	E		A			A							E
9	I		A	A		A	A	A					I		
10	I		I		E					A		A			
11	A			A			I	E	A		A				

Table 7.5: summary of results of Tasks 2 and 3 for each participant

Key: A correctly assigned; I = identified as the incorrect word; E= error corrected

Item	Correct form	Incorrect form
G1	*yurḥam* (masc.)	*turḥam* (fem.)
G2	*laysa (masc.)*	*laysat (fem.)*
G3	*takūnū* (2nd ps. plur. masc.)	*takunna* (2nd ps. plur. fem.)
G4	*alayhinna* (fem.)	*alayhim* (masc.)
G5	waylakum (masc.)	*waylakunna* (fem.)
N1	*khāshiʿan* (sing.)	*khāshiʿīna* (plur.)
N2	*-lladhīna* (plur.)	*-lladhī* (sing.)
N3	*qāla* (sing.)	*qālū* (plur.)
N4	*akhliṣū* (plur.)	*akhliṣ* (sing.)
N5	*uʿṭī* (1st ps. sing.)	*nuʿṭī* (1st ps. plur.)
C1	*bi-l-mikyāli* (gen.)	*bi-l-mikyāla* (acc.)
C2	*al-ṣāliḥīna* (gen.)	*al-ṣāliḥūna* (nom.)
C3	*asmaʿu* (nom.)	*asmaʿa* (acc.)
C4	*fī l-ṣalāti* (gen.)	*fī l-ṣalāta* (acc.)
C5	*munāfiqīna* (acc.)	*munāfiqūna* (nom.)

Table 7.6: key for the symbols and for the list of words

According to the results, out of total 55 sentences for each error-type , gender was correctly assigned to the incorrect pile 29 times, followed by number 19 times, followed by case 14 times (see table 7.7). Not only were sentences with an error in gender correctly assigned to the error pile the highest number of times as compared to number and case, but a greater number of participants also showed understanding of where the error lay in gender sentences. Out of the total 29 instances, the exact location of the error was correctly identified 11 times. As far as correcting the errors was concerned, only three participants provided correct replacements. No two participants could correct an error in the same sentence, suggesting lack of systematic awareness of the morphological patterns.

Sentences with an error in number were correctly assigned to the incorrect pile 19 times. However, in terms of locating the error, participants did poorly. Only two participants could correctly identify the locus of error in these sentences. In terms of correct replacement for the

incorrect word in the sentence, only one participant came up with a correct version, saying *Qālū* should be *Qāla.* However, he could not say why.

As for case sentences, four participants could correctly identify the location of error. Only one participant could correct the error. It is important to note that across error type there were no instances at all of an error being located by more than one person.

Participant	***Gender***	***Number***	***Case***	Total
Participant 1	5	2	1	08
Participant 2	3	1	2	06
Participant 3	2	0	0	02
Participant 4	1	2	1	04
Participant 5	2	4	2	08
Participant 6	3	2	1	06
Participant 7	2	0	3	05
Participant 8	3	1	1	05
Participant 9	3	3	1	07
Participant 10	3	1	1	05
Participant 11	2	3	1	06
	29	19	14	62

Table 7.7: Break-down of error-types per participant for non-Arabic speaking participants

Turning now to participants who showed some promise in spotting and explaining the errors in different sentences. They were participants 7, 8, 10 and 11. Participant 7 correctly located errors in four sentences (G=3, C=1), participant 8 in five sentences (G=3, N=1, C=1), and participant 10 in four sentences (G=3, C=1). Incidentally, these participants were spot-on in task 1 and had correctly separated Quranic from the non-Quranic sentences. Participant 8 was also ahead of others as he was the only participant who provided correct replacements for errors in two sentences, one gender and one case. Participant 11 correctly identified errors in three sentences (N=2= C=1), and was able to explain the error in one. These four participants were also more confident in their decisions as compared to other participants.

The above analysis indicates that the three morphological patterns lent themselves to different degrees of awareness: different participants showed a variable amount of awareness of the patterns of Classical Arabic. Overall, participants showed better awareness of gender patterns as compared to number and case (see table 7.8 below). This superiority in awareness was in

terms of correctly assigning the incorrect sentences to the incorrect pile, identifying the location and explaining the cause of the error.

Error type	Error correctly identified	Correct explanation
Gender	11	03
Case	06	01
Number	03	01

Table 7.8: Break-down of error types for non-Arabic-speaking memorizers in terms of correct identification and explanation

What could be the reasons for the difference in above results? Although the differences, as far as identifying the location of error between case and number sentences is concerned, are not great, the difference between gender and number sentences is large.[11]

The relatively better results for gender as compared to the other error types drew my attention to the possibility that errors in gender might have been more obvious and easier to spot than errors in number and case. It was possible that gender sentences were constructed in a way that might have alerted the participants to the error in them more sharply compared with the other two error types. So, I wanted to find out if it was relatively easy for the participants to work out and notice errors in gender compared with errors in number or case.

I, therefore, analysed sentences for any such 'signs'. The analysis revealed that in four out of five gender sentences words with a correct and incorrect morpheme either occurred back to back or there was a repetition of the correct morpheme in the sentence which might make the anomaly in agreement more noticeable. The following sentence is one such example: *Inna hu man* ***yarham turham*** *wa man yasmut yaslam* **(*He who has mercy, to him will mercy be given; and he who is silent will be safe)*.** In this sentence, *yarḥam*-***he who has mercy***, and *turḥam*-***you will be given mercy*** (instead of *yurḥam*-***he will be given mercy***) occur back to back. Similarly, in a sentence *Wa-matā sallay*-***tum*** *falā takunna ka-l-munafiq-īna wa- lā-*

[11] Research by Brown (1973), Dulay and Burt (1973, 1974a, 1974b), and Krashen (1981, 1985) has suggested that there are systematic, predictable developmental stages in morpheme acquisition in both L1 and L2. As far as a universal order of acquisition for gender, case and number is concerned, research has shown that number is acquired earlier, followed by case, and gender (Brooks and Kempe 2014). All of that data is, however, about the productive and meaningful use of the morphemes, which seems too far from what is happening here.

11

tukarrir-ū *l-kalām a bātel- an (**And when thou prayest, thou shalt not be as the hypocrites are and use not vain repetitions.),*** two of the three verbal forms i.e. *Sallaytum*-**you pray(ed)** indicating 2nd ps. masc., and *lā tukarrirū*-**do not repeat** indicating 2nd ps. masc., are addressed to men. In the same sentence, however, the verb *takunna* is a form of the verb *kāna*-***to be***, in which case it addresses fem. plural (marked by *t-…na*).

However, there were similar signs in the sentences with case errors and, here, they did not appear to help as much with identification. Sentences with case errors were signalled by a preposition. A basic rule in Arabic is that all Arabic prepositions should be followed by a noun or pronoun in the genitive. For example, in the sentence *Ka-mā tadīn- ūna tudān- ūna wa- **bi**- l- mikyāl- a llazī takīl- unā yukālu la- kum (**As you judge so you will be judged, and with the measure that you use it will be measured to you**)* the preposition *bi*-***with*** should be followed by a noun or pronoun in the genitive. The noun *-l-mikyāla*-***the measure*** has the accusative marker *–a*, which is evidently wrong; correct is *–l-mikyāli*, with the genitive marker *–i*.

Another basic rule is that normally the subject in Arabic has the nominative case. A very common sentence type in Arabic, however, introduces the subject of a sentence with the particle *inna*, which has a "topicalising" function, marking the following noun or pronoun as the topic of the sentence (This is like beginning a sentence in English with 'As for'). This particle is always followed by an accusative. For example, in sentences, *Inna l-munāfīq- ūna yuserr- ūna ghayra mā yu'alīn- ūna wa- yuzmir- ūna ghayra mā yuzhir- ūna (***The hypocrites keep secret what they do not make public and conceal what they do not divulge),** *inna l-munāfiqūna*-***the hypocrites***, with the ending *–ūna* (nominative, masculine plural) is clearly an error for *inna l-munāfiqīna* (with the ending *–īna*, used for accusative or genitive masculine plural).

As can be seen from the examples above, sentences with errors in case would be expected to be most easily spotted. Because the memorizers would have come across such patterns before, they might be supposed to have a very clear memory that the preposition plus that word led to a particular ending on it. The results however showed that the participants had not internalized the rule.

The discussion with participants about the sentences identified as 'incorrect' revealed an interesting thing about some participants' approach towards findings errors. Participants had assigned a number of correct sentences to the incorrect category. As a result, they were

looking for ‘incorrectness’ in them that was not there. They appeared to randomly point to a word and say that it sounded wrong to them but they were not able to say why. This random approach reminds us that caution is needed in interpreting the correct results.

There were four participants i.e., 1, 5, 6 and 11 who went a step ahead as they would sometimes point out a word and say that it was not written correctly. Although they had been explicitly told to ignore the orthographic form and look for things that did not sound correct to them, these four participants could not take their attention off the visual form. Probably their focus on finding errors in the ‘incorrect’ sentences led them to search for something wrong and, if nothing else, they looked for error in the written form. It is important to mention that all sentences were very carefully composed and there was no problem as far as the orthographic details are concerned. Each one of these four participants, however, pointed to a different sentence regarding the problem with the orthographic form.

The above results indicate the Quran memorizers’ lack of awareness into language patterns is not in line with findings of research literature on the relationship between memorization and language learning.

As mentioned earlier (see section 7.1.3), the main experiment was curtailed because the results were pretty uniform. Instead an additional experiment on another population (i.e. the native speakers of modern Arabic) was done. Since participants in the main experiments had found the grammaticality test (i.e. Task 2) so difficult, it was worth checking that the task actually was doable by people who had a much greater chance of spotting the errors—speakers of modern Arabic.

7.3 Grammaticality judgement task—native Arabic-speaking memorizers

It was predicted that Quran memorizers who were native speakers (NS) of Arabic (albeit not Classical Arabic) would be able to complete the task at above chance level. They would have an advantage over the non-Arabic-speaking memorizers in terms of having a greater opportunity to develop awareness of grammatical patterns of Classical Arabic.

Modern standard Arabic and Classical Arabic are not by any means the same. Modern Arabic is the language of communication, media and education in the Arab world. It is important to note that there are many versions of modern Arabic and a major distinction relates to standard

written version and various diverging and mutually unintelligible spoken dialects (Kaye 1998, p. 676. See below). Classical Arabic, on the other hand, is restricted to religious/liturgical contexts. Whereas Classical Arabic has a complex grammar, Modern Arabic has got a somewhat simplified grammar. The main difference, however, lies in the vocabulary: modern Arabic has shed vocabulary of Classical Arabic to the point that a contemporary speaker of Arabic finds it difficult to comprehend the Classical version, unless he/she is trained/educated in it. According to Holes (1995):

> Modern Standard Arabic (MSA), or Modern Literary Arabic (MLA), is the modern descendant of Classical Arabic, unchanged in the essentials of its syntax, but very much changed, and still changing, in its vocabulary and phraseology (p. 4).

Ryding (2005) comes up with similar views:

> Differences between CA and MSA are primarily in style and vocabulary, since they represent the written traditions of very different historical and cultural eras, from the early medieval period to the modern. In terms of linguistic structure, CA and MSA are largely but not completely similar (p. 4).

Comparing the two versions of Arabic, Kaye (1987) states:

> Surprisingly enough, due principally to Islam, the classical language has changed in grammar very little since the 7th century AD. In fact, most students are amazed at the easy transition between reading a modern novel and a *sura* [chapter] of the Quran (vocabulary and stylistics are other matters, however) (p. 666).

Kaye, however, notes that

> [..] the differences between many colloquials and the classical language are so great that a f*allah* [peasant] who had never been to school could hardly understand more than a few scattered words and expressions in it without great difficulty. […]. Indeed all colloquial Arabic dialects are acquired systems but the classical language is always formally learned (p. 667).

Thus for the Arabic-speaking participants, Classical Arabic was still a foreign language, but overall it would offer a lot more semantic and grammatical cues to speakers of Modern Arabic than to speakers of Urdu and Pashto.

Given that there are several versions of modern Arabic, speakers belonging to one dialect group, that is, Palestinian Arabic were selected to minimize the variable influence of different dialects. They had not studied Arabic at school. Although they were native speakers of a dialect of Arabic, they mostly used it for speaking with parents and sometimes with friends and other people in the mosque. According to them, they occasionally watched TV programme in Arabic and sometimes read magazine articles. No one, however, used Arabic for writing purposes. Classical Arabic was unintelligible to them, and they, therefore, would not have a ceiling effect on the grammaticality judgement task.

Our participants were four native Arabic-speaking Quran memorizers from two mosques in Cardiff city. While they were born in the UK, their parents had migrated from Palestine. Two of them were 18 years old, and two were 19 and 20 years old, respectively. The procedure followed was the same as for the non-Arabic speaking memorizers in task 2. While one participant (i.e. NS1) had memorized 27 Parts, the other three had completed memorizing the whole of the Quran a year ago.

According to the results, the Arabic-speaking participants, like the non-Arabic speaking participants, assigned more sentences i.e., 77 to the grammatically correct category as compared to 43 to the incorrect category (see table 7.9 below). Across the participants, the analysis of sentences within each category showed that Arabic-speaking participants, like their non-Arabic speaking counterparts, had little awareness of correctness and incorrectness (see appendix H).

Combined	Judged as grammatical	Judged as ungrammatical	Total
Actually grammatical	38	22	60
Actually ungrammatical	39	21	60
Total	77	43	120

Summary Table 7.9: combined results for Task 2

The Chi-square results for all participants were not significant. Results from the Fisher's exact test were statistically not significant either.

Participant	χ^2	Df	P>
NS1	1.2	1	0.05
NS2	0	1	0.05
NS3	0.68	1	0.05
NS4	1.42	1	0.05

Table 7.10: The Chi-Square results for the number of actually incorrect sentences out of total sentences identified as incorrect

Figures 7.5 and 7.6 indicate the distribution of sentences into grammatical and ungrammatical categories, respectively. The participants were to separate 30 sentences into two categories. Each graph represents the judgement of each participant by two colours: in graph 7.5, the blue indicates sentences that were judged grammatical whereas the pink indicates that were actually grammatical. In graph 7.4, the orange indicates sentences that were actually ungrammatical whereas the green shows sentences that were actually ungrammatical. The sum of the two colours representing 'actual' i.e. blue (graph 7.5) and orange (graph 7.6) amounts to the total number of sentences i.e. 30.

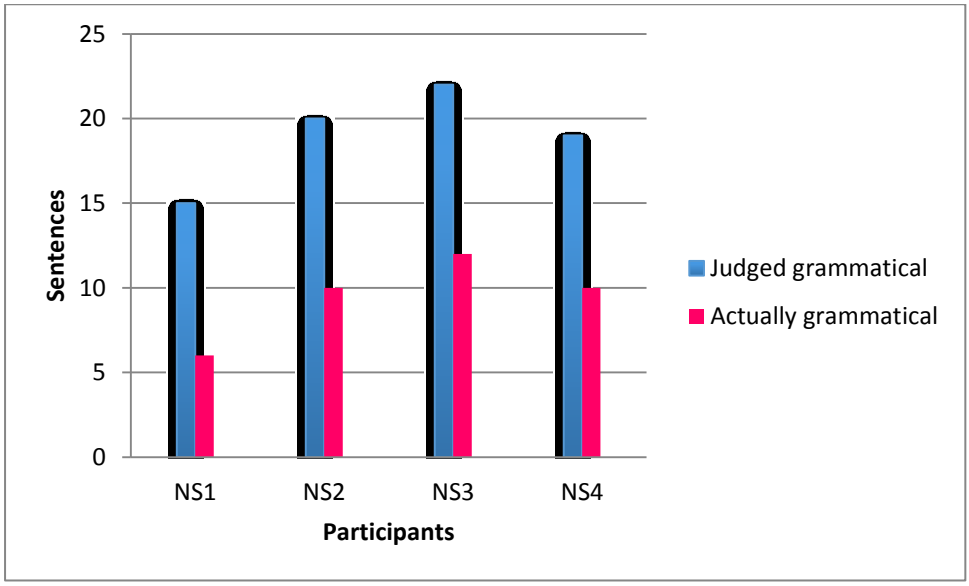


Fig 7.5. Distribution of sentences that were judged grammatical by Arabic participants

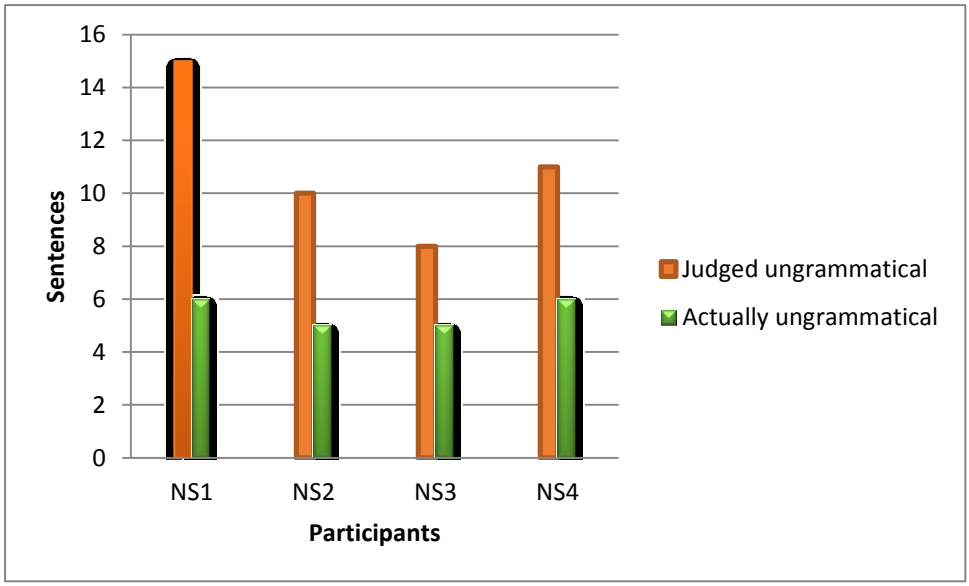


Fig 7.6. Distribution of sentences that were judged ungrammatical by Arabic participants

The performance of the native participants at a chance level similar to that of the non-Arabic memorizers revealed that the non-Quranic sentences were not more difficult for the non-Arabic speaking participants than for the native participants as had been initially imagined. That not a single native Arabic-speaking participant could separate grammatically correct sentences from grammatically incorrect sentences at higher than chance level showed that they, also, had internalized little knowledge of Classical Arabic.

However, in terms of explaining and correcting the errors in sentences identified as incorrect, three participants i.e., NS2, NS3, and NS4 showed maximum performance. NS2 and NS3 correctly identified errors in five sentences each, and were able to correctly explain errors in four sentences each. Participant NS4 correctly identified errors in six sentences and was able to correctly explain all of them.

This difference in ability at separating correct from incorrect sentences, on the one hand, and locating and explaining the errors, on the other, was perplexing. Could their poor performance at separating correct in correct sentences be the result of lack of attention to the errors in sentences? Was it possible that they could have performed better if they had been given more time? From the way the task was conducted the answers to these questions are in the negative. They were given enough time to judge a sentence and declare it correct or incorrect. Similarly, they were asked to read a sentence carefully and see if some word

sounded wrong to them. They had read out a sentence quite a few times before they assigned it to correct or incorrect pile. It suggests that they were quite sure about the sentences they declared incorrect in the first place and had no clue about incorrectness in incorrect sentences assigned to the correct pile.

Participant	G	N	C	total
NS1	3	1	2	6
NS2	3	1	1	5
NS3	1	2	2	5
NS4	2	3	1	6
	09	07	06	22

Table 7.11: Break-down of error types per participant for native Arabic-speaking memorizers

Table 7.11 shows that the Arabic-speaking participants performed at a level similar to that of the non-Arabic speaking participants in terms of correctly assigning the three error-types to the respective categories. Gender was correctly categorized as incorrect nine times, followed by number seven times, followed by case six times.

7.3.1 Participants' comments on sentences they categorised as 'incorrect'

An informal discussion with the native speakers checked their capacity to locate and correct the errors they had identified, and revealed that overall they were more able to do so than the non-native speakers. This section will focus on the analysis of what the participants said about sentences they had identified as 'incorrect'. The analysis includes (a) correct allocation of incorrect sentences to the incorrect pile; (b) identifying the correct location of error in the sentences identified as incorrect; (c) explaining the error or/and replacing the wrong morpheme with a correct one. Table 7.12 summarizes the results for each participant.

Participant	G1	G2	G3	G4	G5	N1	N2	N3	N4	N5	C1	C2	C3	C4	C5
NS1		A	A		A				A			A			A
NS2		I		I	E					I				I	
NS3					E				E	E	A			E	
NS4		E			E		E		E	E		E			

Key: A correctly assigned; I = identified as the incorrect word; E= error corrected

Table 7.12: summary of results for Tasks 2 and 3 for each participant.

(See table 7.6 above: key for the list of words with correct and incorrect morpheme)**.**

In terms of providing correct replacements for the incorrect morphemes, NS4 was at the top with correct answers for six sentences, followed by NS2 and NS3 with correct explanations for four sentences each.

As for identifying the location of the error, gender was spotted six times by three participants of which *waylakunna* was spotted three times, *(laysat)* two times, and (*a layhim*) one time. Errors in number were correctly spotted six times by three participants of which *nuʿṭī* was spotted three times**,** *akhliṣ* two times, and *lladhī* one time. Error in case were correctly identified four times by three participants of which *fī l-ṣalāta* (acc.) was correctly identified twice, while *bi-l-mikyāla* and *al-ṣāliḥūna* (nom.) once each by two participants. In terms of correctly explaining the error type, gender was correctly explained five times, number six times and case three times (see table 7.13).

Like their non-Arabic counterparts, these participants had assigned some of the correct sentences to the incorrect category. They could not say why these sentences were wrong, only that they sounded wrong to them. Unlike some non-Arabic participants however, they did not find 'problems' with the orthographic details.

Error type	Error correctly identified	Correct explanation
Gender	06	05
Number	06	06
Case	04	03

Table 7.13: Break-down of error types for Arabic-speaking memorizers in terms of correct identification and explanation

The above analysis indicates that although both non-Arabic and Arabic-speaking participants have had non-significant assignment, participants showed some sensitivity to the odd examples. However, Arabic speakers were better at spotting what the error was once they had found it (see the conclusion section of this chapter).

7.4 Correspondence between performance on sorting Tasks 1 and 2

An important part of the analysis was to see if some correspondence existed between performance on task 1 and task 2. In other words, did someone who perform well on task 1 also did well on task 2? It is important to know this because it might throw some light on relationship between the memorizers' memory of the text and their sensitivity (or lack of it) to language patterns.

The results revealed mixed evidence for a relationship between memory for the Quran and awareness of morphological patterns in Classical Arabic. For example, participants 7, 8, and 10, who were absolutely accurate in separating Quranic and non-Quranic sentences, also did well in terms of locating errors and substituting correct morpheme for the incorrect one, compared with those who were not absolutely accurate in task 1. Similarly participant 11 who assigned only one Quranic sentence to the non-Quranic pile, and one non-Quranic sentence to the Quranic pile, correctly identified errors in three sentences and was able to explain the error in one. In contrast, participants 6, 3, and 9 despite performing well on task I could not perform well on task 2.

In the light of the above results, evidence for relationship between the participants' performance on separating Quranic from non-Quranic sentences and their performance on grammaticality judgement is mixed and strong conclusion cannot be drawn in this regard.

An interesting factor that seemed to bear upon the performance in task 2 which I had not anticipated was the memorizers' perception of their memory and memorization. For example, participants 3 and 4, after having performed the task, said that they did not have solid memory of the Quran. They said that their memory of the Quran was not as strong as that of other fellow memorizers. These two participants not only showed the lowest performance in terms of correctly allocating sentences to the incorrect categories by assigning two and four

sentences, respectively, they also could not identify the location of the error in a single sentence.

7.5 Conclusion

When we entered this chapter we wanted to know whether the non-Arabic speaking memorizers of the Quran incidentally internalize some features of Classical Arabic by virtue of their memorization. To establish this, participants were tested, in two separate tasks, on their memory of the Quran and their awareness of morphological patterns of Classical Arabic.

The three research questions posed at the beginning of this chapter will be answered here:

(1) Can the Quran memorizers separate Quranic sentences from non-Quranic sentences?

(2) Can the Quran memorizers reliably separate grammatically correct sentences from grammatically incorrect sentences?

(3) Can the Quran memorizers indicate errors in the sentences they have identified as incorrect?

The capacity of all the participants successfully to separate the Quranic from non-Quranic sentences in Task 1 suggests that extensive repetition and rehearsal of the Quran made the text sufficiently familiar to them for it to be plain which sentences they had and had not seen before. Results from Task 2, i.e., the grammaticality judgement task, on the other hand, were mixed. While categorisation of sentences into correct and incorrect was only at a level of chance, locating and explaining the errors by some participants might be taken as indication of their having developed some understanding of the language patterns. However, even if these results do show that some participants internalized the correct patterns to explain the incorrectness, we need to be cautious in interpreting them. Although pointing to the location of an error is hard to get right by chance, there still is a chance element. And, indeed, participants did on occasion point to a location that had no error (in sentences that did have

one). Where there was no error in the sentence, any indication they gave of the supposed error's location was, of course, also wrong.

As for the Arabic-speaking memorizers, they had an advantage over the non-Arabic-speaking memorizers that enabled them to more often identify the location and explain the nature of the error in sentences identified as incorrect. Nevertheless they still did not identify the sentences with errors at above chance level. It seems that they knew a few and didn't know others. The ones they knew, they got right. So, although the statistics talk about chance, it's really about the chances of them encountering an example they could do, rather than only about them guessing when they didn't know the answer. It is not clear whether their ability to explain and correct the errors was the result of their memorization or if they already knew these patterns because of their being native speakers of a dialect of Arabic, and familiar with standard written Arabic. However, if extrapolation from the memorized Quran were indeed happening, we might expect that, with the advantage they had, they would have performed at greater than chance level overall.

Returning to the non-Arabic memorizers, the results are certainly are at odds with the implicit claims in the literature about the role of memorization in L2 learning.

In chapter 4, the following three alternative explanations for storage were compared in terms of their predictions as far as Quran memorizers' sensitivity to language patterns was concerned.

Prediction1- Mental lexicon: *Quran learning would entail looking for opportunities to identify… patterns, so as to reduce the load on memory.*

Prediction 2- Episodic Long Term Memory: *Quran learners would have extremely accurate memory traces of the patterns into which the language falls, and therefore should be very much able to identify anomalous patterns that they have never previously encountered.*

Prediction 3- Procedural memory: *When a Quran learner reads aloud a sentence in Classical Arabic that involves a sound-sequence never produced before (that is, one that begins in a familiar way but continues in an unfamiliar way) he should be able to notice it.*

Although all three explanations predicted some sort of sensitivity, none of them are confirmed, and this raises important questions about just what happens in Quran memorization.

In the final chapter the reasons for the present results will be discussed, especially the key differences between the Quran memorizers and the sorts of L2 learners discussed in the research literature. We will explore factors that might have stood in the way of the non-Arabic speaking participants' awareness of grammatical patterns of Classical Arabic.

Chapter 8

Concluding Discussion

This final chapter offers some important insights that arise from the research, and reflects on the potential impact of limitations in the design and scope. It concludes with a short overview statement of what the thesis has achieved.

8.1 Implications of the findings

The starting point for this study was the central question i.e. *does memorization without comprehension give Quran memorizers a 'foothold' into the language? That is, do Quran memorizers develop foundational insights into the nature of Classical Arabic?* Two empirical studies (see chapters 5 and 7) were conducted to shed light on the processes of memorization and the memorizers' sensitivity to language patterns, respectively. The studies were complementary in that findings on the memorization practices of the Quran memorizers helped explain results of the language tests.

To address the central research question, four sub-questions were introduced in chapter 1 and progressively addressed, with the following summary outcomes:

1. *What kinds of memory are there and how does information enter and stay in different memory systems?*

The research literature distinguishes between two kinds of memory system: short term memory (STM) and long term memory (LTM). STM is phonological in nature, is rehearsal based, and can store a limited amount of information over a period of seconds only. LTM, on the other hand, is semantic in nature and can retain information for years without rehearsal. It was noted that 'semantics' restricted to linguistic meaning was too narrow a criterion. Semantics was thus defined broadly and extended to cover visuo-spatial and mnemonic hooks to anchor form in memory. It was suggested that LTM was more of a continuum than an absolute, so that material might get part way and need rehearsal to be sustained.

2. *What are the specific practices of Quran memorizers?*

Chapter 5 showed that Quran memorizers acquire the Quran text through incessant repetition and are engaged in life-long rehearsal to retain the text over the long memory.

3. *What evidence is there that a foreign language might be learned passively as a result of memorization?*

The literature suggested that memorization certainly can result in language learning. The link between memorization and language learning, however, is not clear. It does seem that meaning, function, or a need to communicate are necessary for memorized material to contribute to derived knowledge.

4. *Do Quran memorizers internalise linguistic information from Classical Arabic or not?*

Despite the predictions derived from the current research literature, neither non-Arabic memorizers nor native speakers of Arabic (see chapter 7) revealed an above-chance awareness of the internal patterns of Classical Arabic. They showed a very low level of sensitivity to identifying errors in morphological patterns.

Consequently, in this chapter we will consider reasons for the memorizers' lack of developing sensitivity to language patterns. Key findings from the previous chapters that will contribute to the discussion in this chapter are listed below:

- The Quran text might be stored in LTM as one large entry, or in smaller chunks, with hooks that are not semantic.
- Socio-cultural constraints work as an important mechanism behind the Quran memorizers' verbatim and errorless recall.
- Faithful and errorless recall prevents sensitivity to language patterns.

The following question will be answered on the basis of the above findings.

What is preventing Quran memorizers from developing sensitivity to pattern recognition in Classical Arabic?

An important finding that emerged from this study is the memorizers' inability to identify morphological errors (see chapter 7). This was an unexpected finding as it was contrary to implicit predictions in literature on the role of memorization in language learning. There is, however, a particular explanation for this which I discuss here.
Interviews with the Quran memorizers showed an extreme emphasis on the need for errorless recall. Error-free recall seems to be the sine qua non of their memorization. In chapter 4 it was noted that a complete and correct recall of information each time is important for its successful recall later (Bjork 1988; Anderson 2010). Because the Quran memorizers are supposed to have a word-perfect recall, there is a maximum emphasis on accurate recall each time they recite to safeguard their memory from being contaminated by incorrect recall on an earlier occasion.

The issue of super-correctness in reciting the Quran is vital to our understanding of the results of the present study. It is important to note that faithful reproduction of the Quran text by the memorizers is constrained by psychological and sociocultural challenges associated with Quran memorization: the consequences of deviating from the word of God in any way are huge. It was suggested in chapter 6 that learning the grammatical system of a language takes place when stretches of text are segmented or broken down into component parts to use creatively in other constructions. Results of the two empirical studies (chapters 5 and 7), however, may indicate that Quran memorizers purposely don't get engaged in a segmentation process to extract the parts even if they recognize that patterns exist. This avoidance of segmentation of text and the resultant inability to translate their memory of the text into the knowledge of the language seems to be governed by the emphasis on super-correctness and faithfulness of recall.

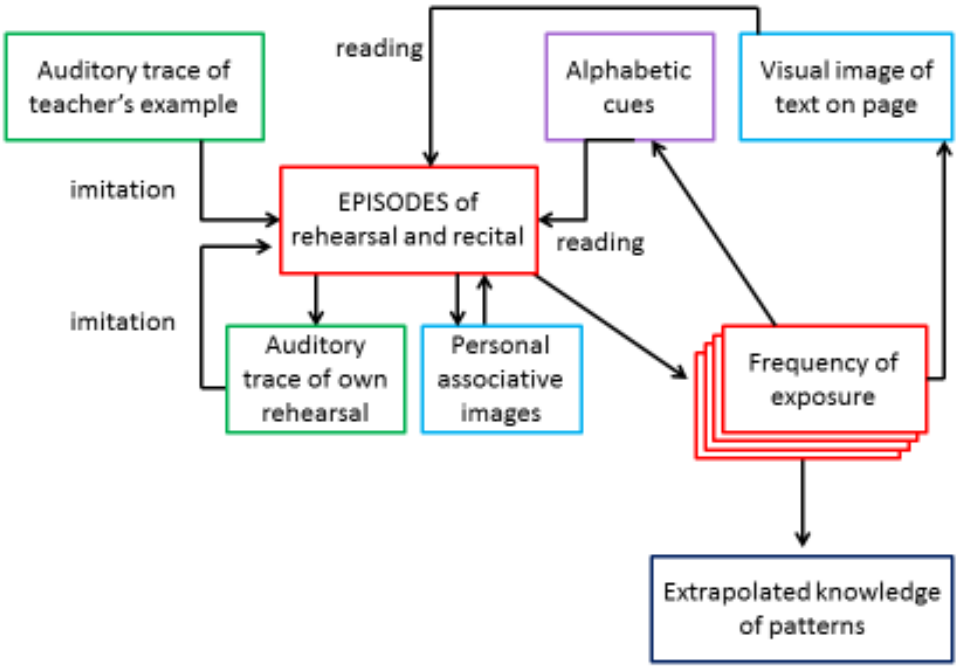
The reason behind the memorizers' not breaking down the text into smaller units is not that they *can't* break down the text but that they *don't need to* and *don't want to*. This attitude on the part of the memorizers offers a more convincing explanation for their failure to internalise patterns in Classical Arabic grammar than only the fact that their input (i.e. the Quran text) was incomprehensible. This is backed up by the fact that the Arabic-speaking memorizers also couldn't judge grammaticality. Krashen (1981, 1985) has proposed that optimally,

learners benefit from input that is just slightly beyond their current level of knowledge. In case of the Quran memorization, of course, the input is well beyond it. As such, it would be feasible to argue that the incomprehensibility alone was enough to explain why they didn't know how to distinguish correct from incorrect morphology. However, research into L2 learning also shows that the learners' attitude towards learning, and towards the language, plays a role (Dörnyei 1990, 2003). Typically, when researchers consider the failure of L2 learners to progress, they attribute it to a resistance to mastering the language, and/or feeling negatively towards it. In the case of the Quran memorizers, they are far from negative towards the language, yet their attitude towards it might still result in a bar on internalising its patterns. In this regard, the blasphemy element of changing the Quran is instrumental (as a strong mechanism for compliance) to preserving the integrity of the original text. So, it can be concluded that resistance that the memorizers have to learning the patterns of the language is an important element of the process.

This gives an important new insight into Islamic culture: it could be that the Quran increased its capacity to survive unchanged because Islam extended beyond the Arabic-speaking world. In a sense, it is the non-Arabic speakers who are the custodians of the text, at least as much as the Arabic-speakers. In chapter 2 it was suggested that in the early days of Islam, memorizers, being the native speakers of Classical Arabic, could link form to meaning. But as Islam spread to non-Arabic speaking societies, memorizers lost the opportunity to link the memorization into an understanding of the text. Hence, the practice of regular and frequent repetition of the text. The non-Arabic-speaking memorizers may therefore be a *model* for other memorizers, rather than an anomaly.

The historical fact of 100% accuracy of the Quran text over many centuries despite being passed through the memories and mouths of so many memorizers has thus important implications for the questions addressed in this study. As a result, all of this prompts a reconsideration of the model of learning that was introduced at the end of chapter 6. Figure 6.1, reproduced here as 8.1 indicated the mechanism by which memorization would lead to learning. However, we can see that in the case of Quran learners, the model needs to be modified to that in figure 8.2. Here, there is a barrier to learning.

Using the ideas developed above, we can examine how and why this barrier operates.



KEY: dark Blue = semantic LTM; Red = episodic memory; Green = STM; Purple = Procedural memory; light blue = pseudo-semantic hooks in LTM

Fig 8.1: Stages in memorization of the Quran and learning of language patterns

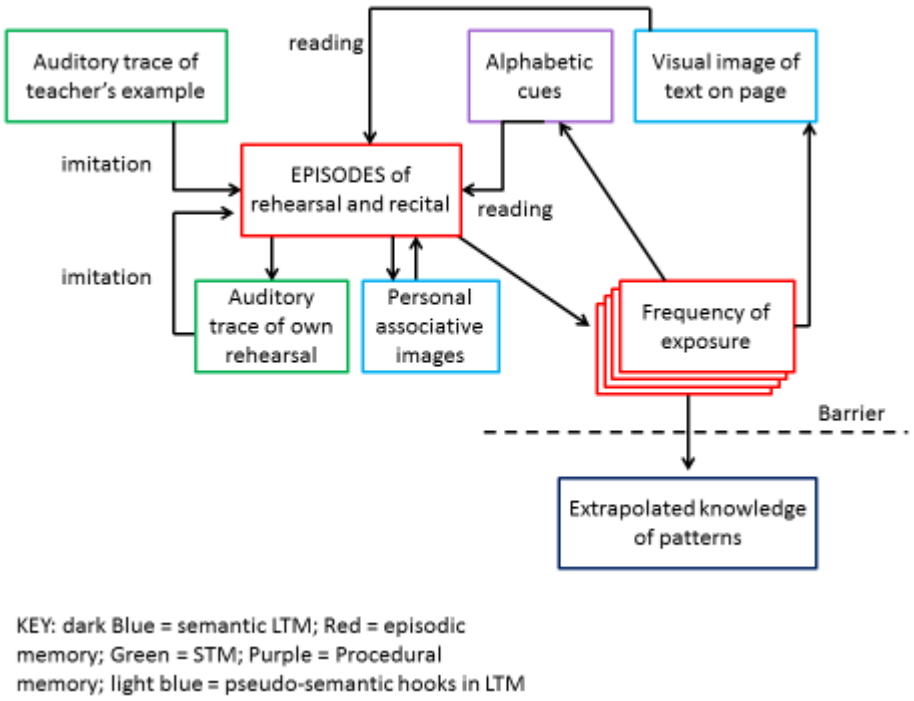


Figure 8.2: Quran memorization and avoidance of learning language patterns

The barrier is needed because of the typical consequences of repetition and extrapolation that occur when memorizing language text. Figure 8.3 shows that if the learner permits extrapolation, then the resultant knowledge, which may be accurate or not, results in risk-taking. Since risk-taking involves making a subconscious judgement about one's ability to restore any information that cannot be fully recalled, it relies on the learner's capacity to judge his or her *productive* knowledge, using *receptive* knowledge as a likely point of reference. The upshot is that errors are introduced in rehearsal and they mingle with the correct model, generating an exposure to both accurate and inaccurate versions. That, in turn, may further contaminate the extrapolated knowledge.

This contamination is what the Quran learners must avoid. And it is the reason that they put the barrier into place that prevents them from extrapolating linguistic patterns.

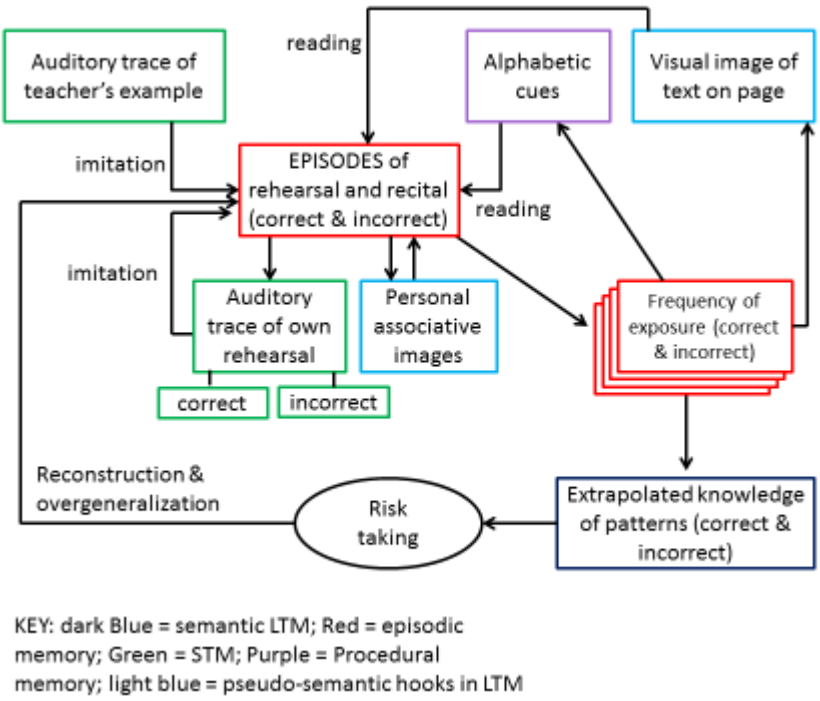


Fig 8.3: Learning of patterns in low-risk memorization context

In chapter 2 we saw that risk taking has also to do with how much ownership one has of the text (Wray 2008). Quran memorizers cannot and do not take risks in their memorization because of their relationship with the Quran text. They consider themselves only as the carriers and transmitters of the word of God. There is absolutely no room for taking liberties with it in terms of deviations or modifications, nor is there room for reconstruction on the basis of language knowledge.

The relationship between risk taking and existing knowledge of the system (i.e. the more you know the more you can reconstruct, so the more risks you can take) thus means that there is a positive disincentive to the Quran memorizers to internalise any of the grammar or lexis. As was observed earlier, it's not just that they don't or can't, but they positively choose not to, because they realise that if they do learn any of the language it will make them much more vulnerable to making errors.

Suppressing incidental learning can thus be construed as a positive and deliberate achievement on their part: the Quran memorizers don't want to learn the language (because they need to keep accurate) and don't need to (because it would be blasphemous to analyse and reuse the text

creatively). Indeed, it is possible that, in line with the research literature, the Quran memorizers actually do internalise some sensitivity to patterns in Classical Arabic—but they resist paying attention to it, or developing it—on purpose. The very thing they don't want is a rationalisation and abstraction of rules—these are not only unnecessary, they are positively dangerous because of the risk of blasphemy. High risk-aversion overrides the advantage of repetition and frequency of input so far as sensitivity to language patterns is concerned.

Quran memorization thus offers a new axis in the risk-taking debate. For Wray and Fitzpatrick (2008) and Wray (2008), the level of knowledge was the independent variable, and as that changed, the dependent variable (risks leading to deviations) altered. In other words, increased language proficiency *enabled* a learner to take more risks. But in the Quran case, the variables are reversed. Because no errors are permitted, no risks are taken—that is now the independent variable. As a result, there is no capacity for learning (the dependent variable) to take place. This is an important finding and turns the notion of risk-taking on its head.

The case of Quran memorization offers a way to delimit the scope of a generalisation found in the research literature—that learning proceeds by virtue of pushing at the boundaries of knowledge, making errors as one goes. In order to internalise the system, one trusts oneself to work things out, even though one also makes errors in the process. The Quran memorizers won't trust themselves and therefore don't learn the system. However, if they don't know the system they can't take risks in the first place. Most learners get themselves out of that fix via the comprehensible input i.e. knowledge +1 as proposed by Krashen—they don't have to take huge risks, just small ones. This is in line with Corder's (1967) and Wray's (2008) argument that making errors is an indication of progress in language learning.

This line of reasoning explains the most surprising finding of the study, that the native speakers of Arabic also performed poorly on the error-detection task (see chapter 7). Although they were native speakers of modern Arabic, and not of Classical Arabic, they still had the advantage of sharing some lexis and grammar with the Classical Arabic. Like non-Arabic memorizers, their need to stick to the literal word by word recall of the Quran appears to have meant that they did not let their (potential) knowledge of the language interfere with their memorization. An informal conversation with a couple of native memorizers (speakers of modern Arabic, see chapter 5) suggested that for them the wording of the Quran is a class apart and they do not let their knowledge of the language help them reconstruct the text.

It was observed in chapter 7 that the 'knowledge' of the memorizers was only Quran-specific: they could not generalize beyond the Quran text. They demonstrated very little awareness of the language grammar and also had difficulty with reading unseen non-Quranic text from Classical Arabic. This was in contrast to their fluent and easy reading of the Quranic verses. It is likely that they don't use the Quran text for reading, only as a memory-jogger: when I see that, I say this. So they are not able to read new text. The huge emphasis on accurate pronunciation of the Quran text had not enabled them to transfer it to text outside the Quran.

8.2 Potential limitations and potential directions for future study

In this research I have gathered data from participants belonging to one language background i.e. Non-Arabic-speaking Pashtun memorizers. The question that arises is: would another group of non-Arabic speaking memorizers behave differently, i.e. better or worse than Pashtun memorizers of the Quran? As we saw that the native speakers of modern Arabic did not perform significantly better than the Pashtun participants, there is no reason to think that a group who knew modern Arabic more than the Pashtuns would be any better.

As for participants with another L1 who might perform worse than the participants of this study, it is possible that speakers of a language that had no vocabulary of Arabic origin in it would perform worse than the Pashtuns; however, if it is historically a Muslim community there will almost inevitably be borrowings at least for concepts associated with religious practices. In chapter 7 we saw that the vocabulary differences between Hindi and Urdu are strongly related to the influence of Islam. But given how poorly the participants of this study did, speakers of a language with no Arabic words could only have performed even worse, and that would not have told us anything more about Quran memorization.

In this research I have used a grammaticality judgement task to elicit data, using sentences from Classical Arabic. We saw in chapter 7 that it was anticipated that the test would be easy enough for the native speakers, yet it wasn't and they performed at almost the same level as non-Arabic speaking memorizers. Would an easier test have given better results? An easier test might involve showing the participants two versions, correct and incorrect, of the same sentence and asking which one is which. In retrospect this might have been a good design, but when the experiment was planned, it was thought that giving them a 'spot the difference'

task that pinned down exactly where the error was, would be too easy. In addition, it would have been very susceptible to chance, in that they would have a 50% likelihood of guessing correctly, given that one sentence was to go onto each pile. For that reason, there might have been problems with that design.

We remember from chapter 2 that the typical pattern in oral traditions is that orality creates different versions, and it's only when one of them is written down that it can be viewed increasingly as the correct reference version. As for the Quran it is universally recognised that there is only one version of it, on which all Muslims agree. Orientalists such as Jeffrey (1937) and Gilliot (2006), however, believe that there was more than one version originally. Irrespective of whether or not there was some decision about a standard version at some point early on, the issue is that ever since it was fixed (during the caliphate of Uthman i.e. 644-656) it has not changed, and that is pretty amazing.

This research has focussed only on memorization of the Muslims' holy book the Quran. But what about other religious traditions, such as Judaism? There, too, there are holy texts that are learned (including as part of the Bar Mitzvah ceremony). But we have seen that the parameters of Quran memorization are subject to particular social and cultural priorities. It is an empirical question, whether other religions' decisions about the precise requirements of text transmission lead to the same patterns as found in this study.

In my research I looked at people who didn't know Classical Arabic. It would be particularly useful to look at a population of memorizers who are also scholars of Classical Arabic. There would be two types of memorizers here: (a) Those who memorized first and then studied Classical Arabic. Would they introduce more errors in their Quran recitation, the more of the language they learned? (b) A population of memorizers who learned Classical Arabic first and then memorized the Quran. Studying them would enable us to explore if their knowing Classical Arabic had an adverse effect on their memorization and recall.

Future research might investigate whether Quran memorizers, as opposed to non-memorizers, would have a head-start or some advantage on the basis of their memorization in learning the language in a classroom setting. The assumption is that Quran memorizers who have already got a large amount of text in memory might just need some minimal tutoring to help trigger awareness of language patterns.

8.3 Concluding observations

Examining the processes and effects of Quran memorization has generated some findings that the existing research literature on memorization and language learning did not directly predict. This indicates that Quran learning is a special case, in which a range of extralinguistic factors play an important role, including those associated with identity, motivation and intention.

In one sense this simply confirms what Quran memorizers have always claimed—there is something very special, indeed mystical, about Quran memorizing. But this study has been able to point to why it is special, and why the approach traditionally taken to Quran memorization is vital and so effective. More broadly, this study provides a distinct marker for other research into memorization, by constituting the extreme end of a continuum of human cognitive activity. There is of course much more research that could be done. Quran memorization has almost certainly not yet revealed all its mysteries.

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Appendix A—Interview schedule for study 1 (chapter 5)

Warm-up questions

1. Are you the first person in your family to memorize the Quran?
2. How old were you when you first recited the entire Quran?
3. How often in your life have you recited the entire Quran? (Or how many times each year do you?).
4. How many years have you been teaching the Quran?
5. Have you learned Arabic formally? Do all Quran memorizers learn Arabic formally? Did you learn Arabic before memorizing the Quran or after? If after, do you find the recall any different from when you had not?
6. Do you speak Arabic at home or any other social occasion?

Basic information about Quran memorization

7. Is it a must for a person to have finished reading the Quran before he starts memorizing it?
8. How long does it take a learner to finish memorizing the Quran?
9. What amount of the text would a learner normally memorize per day?
10. What are the occasions on which you recite a substantially large part of the Quran?
11. How is the recitation during Ramazan prayers different from recitation on other occasions?
12. Do you think people who have excellent memory for the Quran are also able to memorize other things in their daily lives such as a list of grocery items?
13. What age does a learner normally start memorizing the Quran? Do some people start memorizing the Quran at a later stage in life, say, after their twenties? Do you find both types of memorizers different in relation to memorizing the Quran? How are they different?

14. What is the normal starting point for a learner?

15. Did you learn Arabic before or after memorizing the Quran? If after, do you find the difference in recall in how you memorized the text?

Questions about mistakes the memorizers make during memorizing and recall

16. Thinking about all the different people whom you have helped or heard memorising the Quran, do you think many of them make mistakes? (If no: how about when they were still learning it? Would they have made mistakes then?)

17. What kind of mistakes do you think they make?

18. Can you give me examples?

19. The Quran memorizers are trained for a serial sequential recall, that is, they have to recall the verses in order they occur in the Quran and the memorizers are not supposed to make any mistakes either in word order or sentence order. Still people must be getting the order wrong by mixing up different parts from the Quran. Can you imagine someone ever starting one verse and mistakenly switching into another verse that was similar, so that they combined part of two verses?

20. While reciting the Quran how do the reciters recognize that they have made an error? How do you recognize that you made an error?

21. Suppose I were to go up to one of the memorizers in a big Mosque, say in London, and ask them to recite for me five different verses about water or in which water is mentioned. Do you think they'd be able to?

22. Which verses do you think they would offer?

23. Would they be able to recite a particular verse if I asked for it, such as the fifth verse of Sura/chapter Yaseen? (Can you?)

Questions on memorizing strategies

24. Once the Quran is memorized, would it normally be retained by the memorizers for the whole of their lifetime? How do people ensure that they maintain the Quranic text intact in their memory for years and years?

25. Suppose you were helping someone who was likely to forget a passage they had just learned. What would you advise them to do, so that they didn't forget it?

26. Do you normally rehearse loudly or silently? Why?

27. I know that learners move their bodies to and fro while learning the Quran. Does moving body in this fashion help learners memorize the Quran? Or does it help to memorize the Quran easily or quickly? Does it help in recall?

28. Research shows us that there are different kinds of learners. Some respond well to what they hear, and others to what they see. I wonder what kind of a learner you think you are? Do you learn more easily by listening to your teachers, or you learn more from a written text? Do you use the same copy of the Quran every time you memorize or do you use different copies? Why do you use the same copy? What is the benefit of it in relation to your memorizing the Quran?

29. Do you see or visualize the page and the position of the word on it while recalling the text?

30. The Quran has a structural organization and is divided into thirty parts and 114 chapters or Suras as they are called in Arabic. This division is not very discrete as sometimes a Sura starts in one part and continues into another. Each Sura is divided into four divisions, clearly marked on the margin of the text. All these details may not be available to young learners as they start, but as they grow and their knowledge of the religion increases, more and more such information will be available to them. I therefore need to ask about this aspect as well. Do you keep this structural organization in mind while memorization and recall? Does it help?

31. If there are certain themes particular to certain chapters which may stand out for their singularity, there is also a repetition of themes and issues across the Quran, emphasizing their importance for Muslims. For example, stories of different prophets, or the rewards/punishment for observing or failing to observe the daily prayers. Does this kind of access to meaning or the understanding of the overall issue or theme described or referred to facilitate the memorization and the recall?

32. Do you think knowing Arabic help in better memorization and recall of the Quran? Can you recall a time when the knowledge of Arabic particularly helped you in recall?

33. I know that memorizers recite the Quran with great speed. Is this speedy recitation in any way important for your recall? Does recitation at a slower rate impede the recall?

Questions on the special features/characteristics of the text and the memorizers

34. What factors do you think make the Quran easy to memorize?

35. What factors do you think make the Quran difficult to memorize?

36. Are all parts of the Quran equally memorable?

37. What are the characteristics of a good Quran memorizer?

38. What do you normally inculcate into the students for successful memorizing of the Quran?

Appendix B—consent form for participants of study 1

Interviews

- I understand that my participation in this project will involve discussion about practices and processes involved in Quran memorization and that it will take 60 to 80 minutes of my time.
- I understand that participation in this study is entirely voluntary and that I can withdraw from the study at any time without giving a reason.
- I understand that I am free to ask any questions at any time. If for any reason I experience discomfort during participation in this project, I am free to withdraw or discuss my concerns with Amjad Saleem.
- I understand that information provided by me for this study, including my own words, may be used in the research report, but that all such information and/or quotes will be anonymised.
- I understand that the information provided by me will be held confidentially, such that only Amjad Saleem can trace this information back to me individually. The original notes and recording will be retained until the research project has been completed and they are no longer needed, at which point they will be destroyed. I understand that if I change my mind about providing information for this research, I can ask for my input to be destroyed.
- I also understand that at the end of the study I will be provided with additional information and feedback.

I, _____ consent to participate in the study conducted by Amjad Saleem, School of English, Communication & Philosophy, Cardiff University under the supervision of Professor Alison Wray.

Signed:

Appendix C— transliterated version of test sentences (correct and incorrect) of Classical Arabic along with explanation and the English translation

Incorrect sentences

Note: the errors are marked in bold italics

Number

(1)

Lā	tastazilla	l-	faqīr-	a	wa-	lā	taghbiti	l-	ghaniyya	wa-
Do not NEG	Despise Verb IMP	The DEF ART	Poor NOUN SING	ACC	And CONJ	Do not NEG	Envy VER IMP	The DEF ART	Rich NOUN SING	And CONJ

kun	inda	zikr-	ī	khāsih-	***īna***
Be VER IMP MASC SING	From PREP	Mention NOUN	1st PS SING MARKER	Humble ADJ	***Marker for PL MAS***

Translation: Do not despise the poor and do not envy the rich, and be humble when mentioning Me.

Explanation: The imperative *kun* ("be") is masculine singular and according to the rule of Arabic grammar the predicate is correctly given in the accusative. However, *kun* is singular and the predicate should also be in the singular: *khāshiʿan* ("humble"); therefore *khāshiʿīna*, with the plural marker –*īna*, is evidently incorrect. *khāshiʿīna*, would be correct if the imperative was plural, that is, *Kūnū* instead of the singular *kun. khāshiʿīna, would be correct if the imperative was plural, that is, Kūnū instead of the singular kun. The plural of tastazilla and taghbiti, the other two imperative singular verbs, would be tastazillū and taghbitū. This shows that there are three indications of masculine singular and how they would look different if they had been plural, leading up to a plural ending on khasih.*

(2)

Tūba	***li-llazī***	ghuferat	āsām-	u	hum	wa-	suterat	khatayā-	hum
Blessed ADJ	***He/who PRO 3rd PS SING***	Are Forgiven VERB 3rd PER PASS	Inequities NOUN PL	NOM	theirs PPON POSS MASC PL	And CONJ	Are covered VERB 3rd PS PASS	Sins NOUN PL	theirs PRON POSS MASC PL

Translation: Blessed are they whose iniquities are forgiven and whose sins are covered.

Explanation: The Arabic relative pronoun is marked for number and gender. In this sentence, - *li-llazī* "(he/him) who" is used for masculine singular. In the rest of the sentence the possessive pronominal suffix *–hum* denoting masculine plural is used twice (*āsāmuhūm* "their iniquities", *khaṭāyāhum* "their sins). Correct would be either *ṭūbā li-llazī*na"blessed are they/those who" (with the masc. plural form of the relative pronoun), or *āsāmuhū* ("his iniquities") and *khaṭāyāhu* ("his sins"), with the masc. sing. possesive pronoun *–hu/hū*.

(3)

Wa'd-	un	mina -	l-	Allāh -	i	li-	man	khāfa -	hū	a'an-	yudkhil ***ū-***	hū
Promise NOUN SING	NOM	From PREP	The DEF ART	God NOUN 3rd PS SING	GEN	To PREP	Those	Fear VERB SING	Him PRON 3rd PS SING	That CONJ	They will let him enter VERB ***PL Ref to God***	him PRO 3rd PS SING

l-	Allāh-	u	l-	Jannat-	a
The DEF ART	God NOUN 3rd PS SING	NOM	The DEF ART	Paradise/garden NOUN SING	ACC

Translation: A promise from God to those that fear Him: that God will let them enter the Garden.

Explanation: The word *Allāhu* ("God") is marked, by means of the nominative ending *–u*, as the subject of the preceding verb. This verb, *yudkhilūhu*, "(that) they will let him enter", is a 3rd ps. masc. plural (marked by *–ū-*); but a 3rd ps. plural cannot be used for *Allāh*/God (even though in the Qur'an sometimes speaks of Himself as "We", 1st ps. plural), and it is therefore clearly an error for the 3rd ps. masc. sing. *yudkhilahū* "(that) he/He will let him enter).

Hū refers to God in Khāfa hū while it refers to the addressee in yudkhila hū in the above sentence.

hū is "him" in the sentences and is correctly analysed as such in the analysis, the translation, however, uses "them" instead. This probably has to do with the general nature of the message.

(4)

Qāl-	***ū***	la-	hū	Yousuf-	u	ara’	surat-	an	tāhera t-	an	wa-
Said VERB PAST 3rd PS	***PLURAL marker***	To PREP	Him PRO 3rd PS SING	Joseph PROP.NOUN	NOM	See VERB PRES 1st PS SING	Figure NOUN MAS SING	ACC	Pure ADJ	ACC	And CONJ

rūh-	an	tayyab-	an	lā	yushbe-	hu	arwāh-	a	l-	Khāti-	īna
Soul NOUN SING MAS	ACC	Good ADJ	ACC	NONEG	Resembles VERB 3rd PS SING	Marker for 3rd SING	Souls NOUN PL	ACC	The DEF ART	Sinner NOUN	PL MASC ACC

Translation: Joseph said to him: I see a pure figure, a good soul, that does not resemble the souls of sinners.

Explanation: The sentence opens with *qālū lahū*, “they said to him” (the verb is marked as 3rd ps. masc. plur. by the ending *–ū*). The following *Yūsufu* (Yūsuf, or Joseph) is marked as subject by the nominative ending *-u*., which suggests that it is in fact Yūsuf who speaks (“Yūsuf said”). In that case, the plural *qālū* is an error for the singular *qāla*, “(he) said”. Also, the verb *arā,* “I see” refers to the singular speaker.

(5)

yā	dāwūd-	u	ʾinn-	ī	***nu*ʿṭī**	l-	kasīr-	a	wa-
O PART	David NOUN (MASC)	NOM	TOPIC	I PRON 1st PS SG	We-give ***VERB IMPF 1st PS PL***	the DEF ART	much NOUN	ACC	And CONJ

ʾarzā	min	ʿibād-	ī	l-	qalīl-	a
I-am-content-with VERB IMPF 1st PS SG	from PREP	servants PL (MASC)	mine PRON POSS 1st PS SG	The DEF ART	little NOUN (MASC)	ACC

Translation: O David, I give much and am content with little from My servants.

Explanation: The particle *innī*, with pronominal suffix *–ī* denoting 1st ps. sing., making clear that “I” is the topic of what follows, cannot be followed by the verbal form *nuʿṭī* (“we give”), *n-* being the marker of the 1st ps. plural; correct would be *ʾuʿṭī* (“I give), with *ʾ*- (glottal stop) being the marker of

the 1st ps. singular. An alternative form that would be correct is *innā nuʿṭī*, ("we give"), where both the pronominal suffix *–nā* and the pronominal prefix *n-* refer to the 1st ps. plural.

Gender

(1)

Inna	li-	nesā-	i+kum	alay-	kum	Haqq-	an	wa-	la-	kum	ʿalay-	***him***	Haqq-	un
Indeed PART	For PREP	Women NOUN PL	Your PRO 2nd PL GEN	Onto PREP	You PRO PL MAS	Rights NOUN PL	ACC	And CONJ	To PREP	You PRON PL MAS	Onto PREP	(to-)them ***PRON*** ***PL*** ***MAS***	Rights NOUN PL	NOM

Translation: Indeed women have rights over you and you have rights over them.

Explanation: That the sentence addresses men is clear not only from the meaning but also from the repeated occurrence of the pronominal suffix *–kum* ("you/your", referring to masculine plural). The syntax and the sense demand that the pronominal suffix *–him* in *ʿalayhim* ("over them") refers to *nisāʾikum*. However, *-him* is masculine plural and the word *nisāʾikum* ("your women") would require the appropriate suffix for the feminine plural, which is *–hinna*, giving *ʿalayhinna*.

(2)

Wa-	matā	sallay-	tum	falā	***takunna***	ka-	l-	munafiq-	īna
And CONJ	When CONJ	Pray VERB	You PRON 2nd PS MAS PL	Do not VERB	Be VERB 3rd PS PLR ***FEM***	As CONJ	The DEF ART	Hypocrites NOUN	PL MASC ACC

wa-	lā-	tukarrir-	ū	l-	kalām	a	bātel-	an
And CONJ	No NEG	Repeat VERB	You MASC PL	The DEF ART	Words NOUN PL	ACC	Vain ADJ	ACC

Translation: And when thou prayest, thou shalt not be as the hypocrites are and use not vain repetitions

Explanation: Two of the three verbal forms in this sentence are addressed to men: *ṣallaytum* "you pray(ed)", with the ending *–tum* using for 2nd ps. masc. in the perfect (demanded here after the conjunction *matā* "when"), and *lā tukarrirū* ("do not repeat"), with the form marked as 2nd ps. masc. jussive (required here after the negative *lā*). The verb *takunna* can be analysed in two ways: either as deriving from the verb *kanna* "to hide", in which case *lā takunna* would mean "do not hide" (masc. sing.)—which clearly does not suit the context—or, more plausibly, as a form of the verb *kāna*, "to be", in which case it addresses fem. plural (marked by *t-...na*). This, however, does not match rest of the sentence; the expected correct form would be *takūnū*, with the form for masc. plural. *'takunna' cannot have been encountered in masculine context because it is feminine plural indicated by na at the end, against nū which marks masculine plural*.

(3)

Wayla-	***kunna***	l-	ajra	ta'khuz-	ūna	wa-	l-	a'mal-	a	tufsid-	ūna
Woe NOUN	***You 2nd PS PRO PL FEM***	The DEF ART	Wages NOUN SING	You Take VERB	MAS PL	And CONJ	The DEF ART	Work NOUN SING	ACC	You spoil/corrupt VERB	MAS PL

sawfa	Talq-	awna	mā	tahzar-	ūna
PART Referring to the FUT	You ncounter VERB		That/Which REL.PRO	You are afraid VERB	MAS PL

Translation: Woe unto you! You take wages but perform bad work. You shall encounter what you are afraid of.

Explanation: The interjection *waylakunna* ("woe unto you!") that opens the sentence suggests that women are being addressed (the pronominal suffix *–kunna* is 2nd ps. feminine plural). The rest of the sentence, even though obviously the same persons are addressed, contains four verbal forms marked as masculine plural by the ending *–ūna* or *-awna*. Evidently, either *waylakunna* is an error for *waylakum* ("woe unto you", masc. plur.), or the four verbs are all wrong (instead of the masculine plural forms *taʾkhudhūna* "you take", *tufsidūna* "you spoil, corrupt", *talqawna* "you encounter", and *taḥdharūna* "you are afraid", one should expect the feminine plural forms *taʾkhudhna*, *tufsidna*, *talqayna*, and *taḥdharna*, respectively).

(4)

Inna-	hu	man	yarham	***tu***rham	wa-	man	yasmut	yaslam
Indeed PART	He PRON MAS SING	Who PRON REL 3rd PS MAS SING	Has Mercy VERB 3rd PS SING	Will be shown mercy to VERB 3rd PS SING PASS ***FEM***	And CONJ	Whoever PRON REL 3rd PS MAS SING	Is silent VERB 3rd PS STATE SING	Will be safe VERB 3rd PS SING PASS

Translation: He who has mercy, to him will mercy be given; and he who is silent will be safe.

Explanation: The relative pronoun *man* functions in terms of syntax as 3rd ps. masc. singular: "he who", or "whoever". *Man yarḥam* means "He who has mercy", and the verb *yarḥam* is marked (by the prefix *y-*) as 3rd ps. masc. sing. The following verb, *turḥam*, functions as the predicate of the sentence of which *man yarḥam* is the subject. The subject of this predicate should therefore be identical to the subject referred to as *man yarḥam*, and thus also be 3rd ps. masc. sing. One would expect *yurḥam* ("he will be given mercy"). The text, however, has *turḥam*, which can only be analysed as either "you will be given mercy" (wrong person) or "she will be given mercy" (wrong gender).

The 2nd person is implausible, even impossible, because one cannot have a correct sentence, either in Arabic or English, of the type "*He who is merciful you will be given mercy".

(5)

Izā	shiʾta	an	tuṭāʿa	fa-	sʾal-	***ī***	mā	yustaṭāʿu
when	you wish	that	you are obeyed	then	ask	***SING FEM***	what	<it> can be done

CONJ	VERB 2nd PS SG MASC	CONJ	VERB PASS 2nd PS SG MASC	CONJ	VERB IMP SG		REL PRON	VERB PASS 3rd PS SG MASC

Translation: When you wish to be obeyed, then ask what can be done.

Explanation: The verb *shiʾta* that introduces the conditional sentence is marked (by the verbal perfect suffix *–ta*) as 2nd person masculine singular. The main clause begins with *fa-sʾal* "then ask", with the imperative masculine singular, which has a zero marker (∅). In the incorrect version the imperative *fa-sʾalī* has the marker of the the feminine singular (*-ī*). Since obviously the same person is addressed with "when you wish" and "then ask", the same gender should be used. Therefore *fa-sʾalī* is incorrect. If a female person were addressed, not only would *shiʾta* be *shiʾti* (with the marker of the 2nd ps. feminine singular *–ti*), but the context would also require *an tuṭāʿī*, "that you (fem,) are obeyed" (also with the marker of the feminine singular *-ī*, as in *fa-sʾalī*).

Case

(1)

ka-	mā	tadīn-	ūna	tudān-	ūna	wa-	bi-	l-	mikyāl-	***a***
as PREP	that-which REL PRON	you-judge VERB IMPF ACT	PL	you are judged VERB IMPF PASS	PL	and CONJ	with PREP	the DEF ART	measure NOUN (MASC)	***ACC***

llazī	takīl-	unā	yukālu	la-	kum
that REL PRON MASC SG	you-measure VERB IMPF ACT 2nd PS	PL	it-is-measured VERB IMPF 3rd PS PASS	to PREP	you PRON PL MASC

Translation: As you judge so you will be judged, and with the measure that you use it will be measured to you.

Explanation: The preposition *bi-* "with" should be followed (as all Arabic prepositions) by a noun or pronoun in the genitive. The following noun *-l-mikyāla* ("the measure") has the accusative marker *–a*, which is evidently wrong; correct is *–l-mikyāli*, with the genitive marker *–i*.

(2)

Inna	l-	Allāh-	a	karih a	la-	kum	l-	a'bas-	a	fī	l-	salāt-
Indeed PART	The DEF ART	God NOUN	ACC	Does not want VERB PRES	To PREP	You PRON PL MAS	The DEF ART	Frivolous ADJ	ACC	In/during PREP	The DEF ART	Prayer NOUN SING

a	wa-	l-	rafas-	a	fī	l-	seyām-	i
ACC	And CONJ	The DEF ART	Indecent ADJ	ACC	In/during PREP	The DEF ART	Fasting NOUN SING	GEN

Translation: God does not want you to be frivolous during ritual prayer or to behave indecently during fasting.

Explanation: As noted above, every preposition in Arabic must be followed by a noun or pronoun in the genitive. In this sentence, *fī l-ṣalāta* is a mistake because the preposition *fī* ("in") is followed by a noun that has the marker of the accusative, *-a*. Correct would have been *fī l-ṣalāti*, with genitive marker *–i*.

(3)

Alas-	tu	asm'-	***u***	l-	sām-	īna	wa-	absar-	a	nāzir-	īna
Am I not VERB	PRON 1st PS	The best of listeners ADJ	***NOM***	The DEF ART	Listener NOUN	PL MASC ACC	And CONJ	The best of seers ADJ	ACC	Seer NOUN	PL MASC ACC

wa-	aqrab-	a	l-	mujīb-	īna	wa-	arham-	a	rāhim-	īna
And CONJ	The nearest ADJ	ACC	The DEF ART	Responder NOUN	PL MASC ACC	And CONJ	The most merciful ADJ	ACC	Merciful	PL MASC ACC

Translation: Am I not the best of those who listen, the best of those who see, the nearest of those who respond, and the most merciful of those who have mercy?

Explanation: The irregular (but very common) verb *laysa* ("is not"), like the verb *kāna* ("to be"), has a predicate in the accusative. Of the following four predicates, all but the first are correctly marked as accusatives (*abṣar-a*, *aqrab-a*, *arḥam-a*). All the more conspicuously therefore, the nominative marker *–u* of the first predicate, *asmaʿ-u* ("the best listener") stands out as incorrect, instead of correct *asmaʿ-a*.

(4)

A'dad-	tu	li-	ibād-	ī	l-	sālih-	***ūna***	mā	lā
I have prepared VERB PERF	PRO 1st PS	For PREP	servants NOUN PL MAS	mine PRON POSS 1st PS SG	The DEF ART	Righteous ADJ	***PL MAS NOM***	That.Which REL. PRON	No NEG

a'in-	u	ra't	wa-	lā	uzun-	u	same'at
Eye NOUN SING	NOM	Has seen VERB	And CONJ	No NEG	Ear NOUN SING	NOM	Has heard VERB

Translation: I have prepared for My righteous servants what no eye has seen nor any ear has heard.

Explanation: In *li-ʿibādī l-ṣāliḥūna* the preposition *li-* ("for") must be followed by a genitive. The following word is an adjective qualifying *ʿibādī*, and should have the same case. However, *-l-ṣāliḥūna* ("the righteous") has the ending *–ūna*, which is a marker of the nominative masculine plural and is clearly an error for *–l-ṣāliḥīna* (the ending *–īna* being a marker of genitive or accusative masculine plural).

(5)

Inna	l-	munāfīq-	***ūna***	yuserr-	ūna	ghayra	mā	yu'alīn-	ūna	wa-
Indeed PART	The DEF ART	Hypocrites NOUN	***PL MAS NOM***	Keep secret VERB 3rd PS	PL	Except CONJ	That PRO REL	They make public VERB 3rd PS	PL	And CONJ

yuzmir-	ūna	ghayra	mā	yuzhir-	ūna
They conceal VERB 3rd PS	PL	Except CONJ	That/which REL.PRO	They divulge VERB 3rd PS	PL

Translation: The hypocrites keep secret what they do not make public and conceal what they do not divulge.

Explanation: Normally, the subject in Arabic has the nominative. A very common sentence type in Arabic introduces the subject of a sentence with the particle *inna*, which has a "topicalising" function, marking the following noun or pronoun as the topic of the sentence. This particle is always followed by an accusative, and *inna l-munāfiqūna* ("the hypocrites"), with the ending *–ūna* (nominative, masculine plural) is clearly an error for *inna l-munāfiqīna* (with the ending *–īna*, used for accusative or genitive masculine plural).

Correct sentences

(1)

Yā	rubba		muta'abid-	u	Allāh	bi-	lisān-	i	hī	muʿādin
O PART	Many NOUN		Worshiper NOUN SING	NOM	God NOUN	With PREP	Tongue NOUN SING	GEN	His PRO 3rd PS SING	To oppose VERB SING

la-	hū	bi-	fi'l-	i	hī	zalūl-	un	fi-	l-	insiyāq-
To PREP	Ref: God PRON OBJ MASC SING	With PREP	Deed NOUN SING	GEN	His PRO 3rd PS SING	ADJ	NOM	In PREP	The DEF ART	

i	ilā	a'azāb-	i	l-	saeer
	To PREP	Torment NOUN	GEN	The DEF ART	Fire NOUN

Translation: Many pose as servants of God with their tongues but oppose Him in deed, meekly driven to the torment of the Fire!

(2)

Laysa	l-	khayr-	u	aan-	yaksur-	a	māl-	u	ka	wa-	walad-	u	ka
Is not VER NEG	The DEF ART	Good NOUN SING	NOM		Is many VERB SING	Indicating singularity	Possessions NOUN PL		Your PRO 2nd PS SING	And CONJ	Children NOUN PL	NOM	Your PRO 2nd PS SING

wa-	lākinna	l-	khayr-	a	aan	yaksur-	a	ilm-	u	ka
And CONJ	But CONJ	The DEF ART	Good NOUN SING	ACC		Is many VERB SING	ACC	Knowledge NOUN ABS	NOM	Your PRO 2nd PS SING

Translation: The good is not an abundance of your possessions or your children but the good is an abundance of your knowledge.

(3)

Fain	kāna-	ti	l-	dunyā	tuhabb-	u	fainna	ha
Though CONJ	Is VERB FEM	FEM marker	The DEF ART	World NOUN SING	Is loved	NOM	Indeed CONJ	Ref to the world PRO FEM

sahāb-	a	tu	saif-	in	tataqashsha-	‘u	an	qalīl-	in
Cloud NOUN SING	ACC		Summer NOUN/ADJ		clears away VERB SING			Shortly ADV	

Translation: Though this world is loved, it is a summer cloud that will shortly clear away.

(4)

Amma	l-	khayr-	u	fala	yakhīb-	u	wa-	amma	l-	shhar-	u
As for CONJ	The DEF ART	Good Noun SING	NOM	Not PART	Shall fail VERB	NOM	And CONJ	As for CONJ	The DEF ART	Evil NOUN SING	NOM

fa-	Allāh-	u	alā	Jazā-	i	hi	qadīrun
So SONJ	God NOUN	NOM					Able NOUN SING

Translation: As for what is good, it shall not fail; as for what is evil, God is able to requite it.

(5)

Wa'd-	un	min a-	l-	Allāh -	i	li-	man	Khāf a-	hū	a'an -	yudkhi la-	hū
Promise NOUN SING	NOM	From PREP	The DEF ART	God NOUN 3rd PS SING	GEN	To PREP	Those	Fear VERB SING	Him PRON 3rd PS SING	That CONJ	He will let him enter VERB SING Ref to God	Him PRON 3rd PS SING

l-	Allāh-	u	l-	Jannat-	a
The DEF ART	God NOUN 3rd PS SING	NOM	The DEF ART	Paradise/garden NOUN SING	ACC

Translation: A promise from God to those that fear Him: that God will let them enter the Garden.

(6)

Kam	min	qaw m-	in	qad	gharr a-	t-	- hum u	l-	duny ā	ḥatt ā	ʾatā	hum u
how-many QUALIF	(of) PREP	people NOUN (MASC)	GEN	PERFECTIVE	deluded VERB PERF	FEM SG	them PRON OBJ MA	The ART	world NOUN FEM	until CONJ	came VERB PERF	(to-) them PRON OBJ

							SC					MASC PL

l-	mawt-	u	fa-	kharaj-	ū	mina	l-	dunyā	murmil-	īna
the DEFART	death NOUN (MASC)	NOM	and-then CONJ	went-out VERB PERF	they MASC PL	from PREP	The DEFART	world NOUN FEM	Destitute NOUN PTC ACT	PL MASC ACC

Translation: So many people have been deluded by this world, until death came to them, so they left the world as destitute people.

(7)

Inna	akhsara	l-	nās	i	safqatan	yawma	l-	qiyāmat-	i	wa-	a'azam-
Indeed PART	One having the worst deal NOUN	The DEF ART	People NOUN SING	GEN		Day NOUN SING	The DEF ART	Judgement NOUN SING	GEN	And CONJ	Greatest ADJ

a	hum	ghabnan	man	bā'a	ākhert-	a	hū	bi-	dunyā	ghayr-	i	hī
	To Them		Who PRO	Sells VE	Hereafter NOUN	ACC	PRO MAS	With PREP	World NOU	Someone else	GEN	His PRO

	PRO POSS MAS PL		REL	R REl			C PLR		N			GEN

Translation: The one who has the worst deal among people on the Day of Resurrection and who suffers the greatest deception is he who sells his hereafter for someone else's worldly matters.

(8)

Ayyoha	l-	nās	u	matā-	u	l-	dunyā	ḥuṭām-	un
O PART	The DEF ART	People NOUN PL MAS	NOM	Enjoyment NOUN SING	NOM	The DEF ART	World NOUN SING	Chaff NOUN MAS	NOM

mūbiun-	fa-	tajjanab-	ū	marā-	hū
Infectious ADJ MAS	So CONJ	Avoid VERB	You MAS PL	Pasture NOUN SING	Its PRO SING MAS

Translation: O people, enjoyment of this world is infectious chaff: avoid it as a pasture ground!

(9)

Kull-	un	yadda ’ ī -	l-	makārem -	a	wa-	lā	makrumat a	illā	lil-
Everyone NOUN SING	NOM	Claims VERB 3rd PER SING MAS	The DEF ART	Noble deeds NOUN PL MAS	ACC	And CONJ	Not NEG	Nobility NOUN	Only PREP	For PREP

muttaqi-	īna
God-fearing NOUN	PL MAS ACC

Translation: Everyone claims to do noble deeds, but nobility is only to the god-fearing.

(10)

Bāder-	ū	bi-	l-	amal-	i	l-	sālih-	i	qabl-	a	Hulūl-	i
Hasten VERB PL 2nd	You PRO PL MA	With PREP	The DEF ART	Deed NOUN SING	GEN	The DEF ART	Righteous ADJ MAS	GEN	Before ADV	ACC		GEN

PS IMP	S											

l-	ajal-	i
	Death/Appointed time NOUN SING MASC	GEN

Translation: Hasten to perform righteous deeds before the appointed time arrives!

(11)

Summa	la'murra-	na	l-	samma'-	a	fal-	takūnanna	tabaq-	an	min	hadīd-	in
Then ADV	Shall command VERB	I 1 st PS PL PRO	The DEF ART	Sky NOUN SING	ACC	So that PRO REL	It shall be VERB	Layer NOUN	ACC	Of PREP	Iron NOUN	GEN

wa-	l-	arz-	a	fal-	takūnanna	sabīka-	tan	min	nuhās-	in
And CONJ	The DEF ART	Earth NOUN	ACC	So that PRO REL	Be VER	Ingot NOUN	ACC	Of PREP	Copper NOUN	GEN

Translation: Then I shall command the heaven that it shall be a layer of iron, and the earth that it shall be an ingot of copper.

(12)

Uslu	ane-	l-	dunyā	wa-	zill-	a	ha	fainna	fi-	l-

Forget VERB IMP		The DEF ART	World NOUN	And CONJ	Shade NOUN	ACC	Its PRON FEM Refe to the world	Indeed PART	In PREP	The DEF ART

Janna-	ti	zill-	an	zalīl-	an
Paradise/Garden NOUN		Shade NOUN	ACC	Dense ADJ ACC	ACC

Translation: Forget this world and its shade, for in the Garden is dense shade.

(13)

Inna	wa'd-	a	l-	Allāh	haqqun	wa-	l-	nār-	u	maswa-
Indeed PART	Promise NOUN	ACC	The DEF ART	God NOUN	True ADJ MAS	And CONJ	The DEF ART	Fire NOUN		

l	Kāfir-	īna
The DEF ART	Infidel NOUN MAS	PL MASC ACC

Translation: Indeed, the promise of Allah is truth and that hell is the everlasting residence of disbelievers.

(14)

Inna	l-	dunyā	bahrun	arīzun	qad	halaka	fī-	hi	l-	awwal-	ūna
Indeed PART	The DEF ART	World Noun	Sea NOUN	Broad ADJ	perfective	Have Perished VER Perfect	In PRE	PRO 3rd PS SING	The DEF ART	Ancient NOUN NOM	NOM

wa-	l-	ākhar-	ūna	fa-	inistata'at-	a	fa-	'ja'al	safīna-	taka
And CONJ	The DEF ART	Later NOUN NOM	NOM	If PREP	You can VERB			Make VERB IMP	Ship NOUN	Your PRO GEN SING

taqwa	I-	Allāh
Fear NOUN	The DEF ART	God NOUN

Translation: The world is a broad sea in which the ancients and the later ones have perished. If you can, make your ship the fear of God.

(15)

Inna	l-	Allāh-	a	yasqi-	l	ebād-	a	l-
Indeed PART	The DEF ART	God NOUN	ACC	Gives water to derink 3RD PS VERB	The DEF ART	People NOUN	ACC	The DEF ART

ghays-	a	mina	l-	sammā-	i	wa-	yunzelu-	l-	qatra
Rain NOUN ACC	ACC	From PREP	The DEF ART	Sky NOUN	GEN	And CONJ	Descends 3RD PS VERB	The DEF ART	Drops NOUN

mina	l-	sahāb	i
From PREP	The DEF ART	Clouds NOUN PL	GEN

Translation: God gives people water to drink by sending rain from the sky, and makes drops descend from the clouds.

Appendix D—consent form for participants of study 2 (chapter 7)

Sentence sorting tasks

- I understand that my participation in this project will involve some sorting tasks relevant to my memorization of the Quran, and that it will take 60 to 80 minutes of my time.
- I understand that participation in this study is entirely voluntary and that I can withdraw from the study at any time without giving a reason.
- I understand that I am free to ask any questions at any time. If for any reason I experience discomfort during participation in this project, I am free to withdraw or discuss my concerns with Amjad Saleem.
- I understand that information provided by me for this study, including my own words, may be used in the research report, but that all such information and/or quotes will be anonymised.
- I understand that the information provided by me will be held confidentially, such that only Amjad Saleem can trace this information back to me individually. The original notes and recording will be retained until the research project has been completed and they are no longer needed, at which point they will be destroyed. I understand that if I change my mind about providing information for this research, I can ask for my input to be destroyed.
- I also understand that at the end of the study I will be provided with additional information and feedback.

I, _____ consent to participate in the study conducted by Amjad Saleem, School of English, Communication & Philosophy, Cardiff University under the supervision of Professor Alison Wray.

Signed:

Date:

Appendix E—spoken instructions for sorting tasks (chapter 7)

General instructions

Please note that the entire session would be audio-recorded for my research purposes.

I am interested in knowing how much Arabic the memorizers of the Quran might know as a bonus from learning the Quran. There is a good reason to believe that just learning the Quran might mean that memorizers would have a head start if they ever wanted to learn Arabic, so I am interested in exactly what sort of head start it is. So I want to get you to do some tasks that at first you may think you can't do very well, but in fact, it may turn out that you can do them quite well.

You are going to take part in two sorting tasks. At the end of the second task we will have some discussion. These tasks are voluntary. Since you are here, I hope you will want to do these tasks. I think you'll find them interesting. But if at any point you change your mind, you just have to say, because you do have the option not to take part.

At the end you will sign a consent form saying that you agree to my using the data.

The tasks involve separating sentences into different piles. You will receive Arabic sentences written on cards. These sentences belong to different categories but are mixed up. All you have to do is to separate sentences into the different categories that I will explain to you. Please listen carefully to the instructions for each task, and do as directed. You can ask questions if you are not clear about the activity.

Instructions for Task 1—separating Quranic sentences from non-Quranic sentences

This task involves separating sentences into two different piles. They are all mixed up. Some of these sentences are from the Quran. I have only used parts of the Quran that you have already memorised. That means you should be quite familiar with them. But some of these sentences are not from the Quran. They have been taken from books other than the Quran that were written in the same historical period. They will look quite like sentences from the Quran, but you would actually never have seen them before. Your job is to separate the Quranic sentences from the non-Quranic sentences.

What I'd like you to do is to pick up a card, read the sentence aloud, and say whether the sentence is from the Quran or not. By the way, you should not assume that the two piles will be the same size.

Then you need to put the Quranic sentences onto a pile here on the large card labelled 'Sentences from the Quran' and the non-Quranic ones onto a pile here on the large card

labelled ‘Sentences not from the Quran’. Try to put all of the sentences into one pile or another. If you’re not sure about one, you can put it to one side and come back to it at the end.

Do you have any questions?

Task 2—separating grammatically correct sentences from grammatically incorrect sentences

You are going to take part in another sorting task. This time all sentences are non-Quranic, so you have not seen them before, other than that you may have seen some of them just now in the previous task.

While some of these sentences are correct, others have got an error in them. They are all mixed up in one pile. I know that you don’t know any Arabic other than the Quran. So I would not expect you to be able to explain the grammar or the errors. That is not the point of this task. Rather, I want to see if, when you read the sentences aloud, your experience with memorizing the Quran has given you a sensitivity to what sounds correct and incorrect. There are good reasons to believe that, even if you don’t *think* you have such knowledge, you may have it hidden deep in your brain.

So, your job is to see if you can separate the grammatically correct sentences from the ones with an error in them. Don’t assume that there are equal numbers of each type. The piles might not end up the same size.

You need to do the same as you did in the last task. Pick up a card, read the sentence aloud and then decide which pile to put it on. You will need to listen to the sentence as you read it, and also look at it, to decide. It doesn’t matter if you don’t know *why* you think there is an error in it, or why there isn’t one. I’m just looking for that intuition, that feeling, that something is wrong with it, or that it is okay as it is.

At the end, we’ll look at the sentences that you think have an error in, and discuss them. But since the audio recording is on already, it’s okay if you say now why you think there is or isn’t an error. But we will still come back to that later too.

Task 3—discussing the sentences identified as having an error in them

Now we are going to discuss sentences which you have identified as wrong. We will discuss each sentence turn by turn.

So, this is item no [N]. Can you read it aloud for me again, please? You said that you felt there was an error in this somewhere. Can you point to where you think it is? (No? Well do you feel it's nearer the start of the sentence or the end of it? Read the first half: do you sense the error already? Read the second half. Do you feel the error is with a particular word? Which one might it be? Do you sense that the error on that word is at the beginning, in the middle or at the end?) Do you have any sense, however faint, of what the correct version should be?

After task completion

Thanks, that's really great. You've been extremely helpful. I've been really impressed by your knowledge of the Quran and I think you've actually come up with some pretty amazing insights about Arabic, even though you've never studied it. By the way, that means, I think, that if you ever did want to study it, you might well find you had a head start over other people, so you might want to remember that for the future.

So, here's what I'm going to do with the information you've given me. I'm going to look at the decisions you made and compare them to what others did. That will give me ideas about how this very subtle kind of intuition works. Then in the end, I'll write it up in my study for my PhD, and hopefully I might even publish something about it. Whatever I write, even immediately, I won't put your name in anything. That's why we had the identity number for you. I don't want you to be worried that I'm going to write, oh, Mohammed Akhbar did this, or thought that, because that might be pretty embarrassing. What I'll do is refer to people as informant 1, informant 2. Of course I know who is who, but no one else will.

One other thing. Obviously I want everyone to have the same experience in doing these tasks, and so it's really important that you don't go off and tell the others what you had to do, or how it went. That might influence what they do when they come in. But once everyone's been tested, it's fine for you to discuss it, and indeed, if you come up with any ideas, either on your own or talking to others, I'd really like to know. So I've written my name an email address on this piece of paper (give it to them) so you can contact me if you have any thoughts on all this afterwards. And of course, if you have any questions.

The last thing we have to do is just agree that you are okay with me using the information you've just given me. If you are, then I just need you to sign here.

By signing you agree to my using the data gained during this experiment.

Thanks.

Appendix F—Results for individual participants (non-Arabic speaking memorizers—Task 1) chapter 7

Participant 1	Judged as Quranic	Judged as non-Quranic	Total
Quranic	10	05	15
Non-Quranic	05	25	30
Total	15	30	45

Participant 2	Judged as Quranic	Judged as non-Quranic	Total
Quranic	15	0	15
Non-Quranic	08	22	30
Total	23	22	45

Participant 3	Judged as Quranic	Judged as non-Quranic	Total
Quranic	14	01	15
Non-Quranic	0	30	30
Total	14	31	45

Participant 4	Judged as Quranic	Judged as non-Quranic	Total
Quranic	15	0	15
Non-Quranic	11	19	30
Total	26	19	45

Participant 5	Judged as Quranic	Judged as non-Quranic	Total
Quranic	15	0	15
Non-Quranic	05	25	30
Total	20	25	45

Participant 6	Judged as Quranic	Judged as non-Quranic	Total
Quranic	15	0	15
Non-Quranic	0	30	30
Total	15	30	45

Participant 7	Judged as Quranic	Judged as non-	Total

		Quranic	
Quranic	15	0	15
Non-Quranic	0	30	30
Total	15	30	45

Participant 8	Judged as Quranic	Judged as non-Quranic	Total
Quranic	15	0	15
Non-Quranic	0	30	30
Total	15	30	45

Participant 9	Judged as Quranic	Judged as non-Quranic	Total
Quranic	13	02	15
Non-Quranic	0	30	30
Total	13	32	45

Participant 10	Judged as Quranic	Judged as non-Quranic	Total
Quranic	15	0	15
Non-Quranic	0	30	30
Total	15	30	45

Participant 11	Judged as Quranic	Judged as non-Quranic	Total
Quranic	14	01	15
Non-Quranic	01	29	30
Total	15	30	45

Appendix G—Results for individual participants (non-Arabic speaking memorizers—Task 2) chapter 7

Participant 1	Judged as grammatical	Judged as ungrammatical	Total
Actually grammatical	05	10	15
Actually ungrammatical	07	08	15
Total	12	18	30

Participant 2	Judged as grammatical	Judged as ungrammatical	Total
Actually grammatical	07	08	15
Actually ungrammatical	09	06	15
Total	16	14	30

Participant 3	Judged as grammatical	Judged as ungrammatical	Total
Actually grammatical	13	02	15
Actually ungrammatical	13	02	15
Total	26	04	30

Participant 4	Judged as grammatical	Judged as ungrammatical	Total
Actually grammatical	06	09	15
Actually ungrammatical	11	04	15
Total	17	13	30

Participant 5	Judged as grammatical	Judged as ungrammatical	Total
Actually grammatical	08	07	15
Actually ungrammatical	07	08	15
Total	15	15	30

Participant 6	Judged as grammatical	Judged as ungrammatical	Total
Actually grammatical	10	05	15
Actually ungrammatical	09	06	15
Total	19	11	30

Participant 7	Judged as grammatical	Judged as ungrammatical	Total
Actually grammatical	09	06	15
Actually ungrammatical	10	05	15
Total	19	11	30

Participant 8	Judged as grammatical	Judged as ungrammatical	Total
Actually grammatical	10	05	15
Actually ungrammatical	10	05	15
Total	20	10	30

Participant 9	Judged as grammatical	Judged as ungrammatical	Total
Actually grammatical	11	04	15
Actually ungrammatical	08	07	15
Total	19	11	30

Participant 10	Judged as grammatical	Judged as ungrammatical	Total
Actually grammatical	10	05	15
Actually ungrammatical	10	05	15
Total	20	10	30

Participant 11	Judged as grammatical	Judged as ungrammatical	Total
Actually grammatical	06	09	15
Actually ungrammatical	09	06	15
Total	15	15	30

Appendix H—Results for individual participants (Arabic speaking memorizers—Task 2) chapter 7

Participant NS1	Judged as grammatical	Judged as ungrammatical	Total
Actually grammatical	06	09	15
Actually ungrammatical	09	06	15
Total	15	15	30

Participant NS2	Judged as grammatical	Judged as ungrammatical	Total
Actually grammatical	10	05	15
Actually ungrammatical	10	05	15
Total	20	10	30

Participant NS3	Judged as grammatical	Judged as ungrammatical	Total
Actually grammatical	12	03	15
Actually ungrammatical	10	05	15
Total	22	08	30

Participant NS4	Judged as grammatical	Judged as ungrammatical	Total
Actually grammatical	10	05	15
Actually ungrammatical	09	06	15
Total	19	11	30

[i] The Fisher's exact test is a special version of the Chi-Square test that is more reliable when the sample size and the expected values are small. According to McDonald (2014):

> If all of the expected values are very large, Fisher's exact test becomes computationally impractical; fortunately, the chi-square or G–test will then give an accurate result. The usual rule of thumb is that Fisher's exact test is only necessary when one or more expected values are less than 5 […] (p. 82).